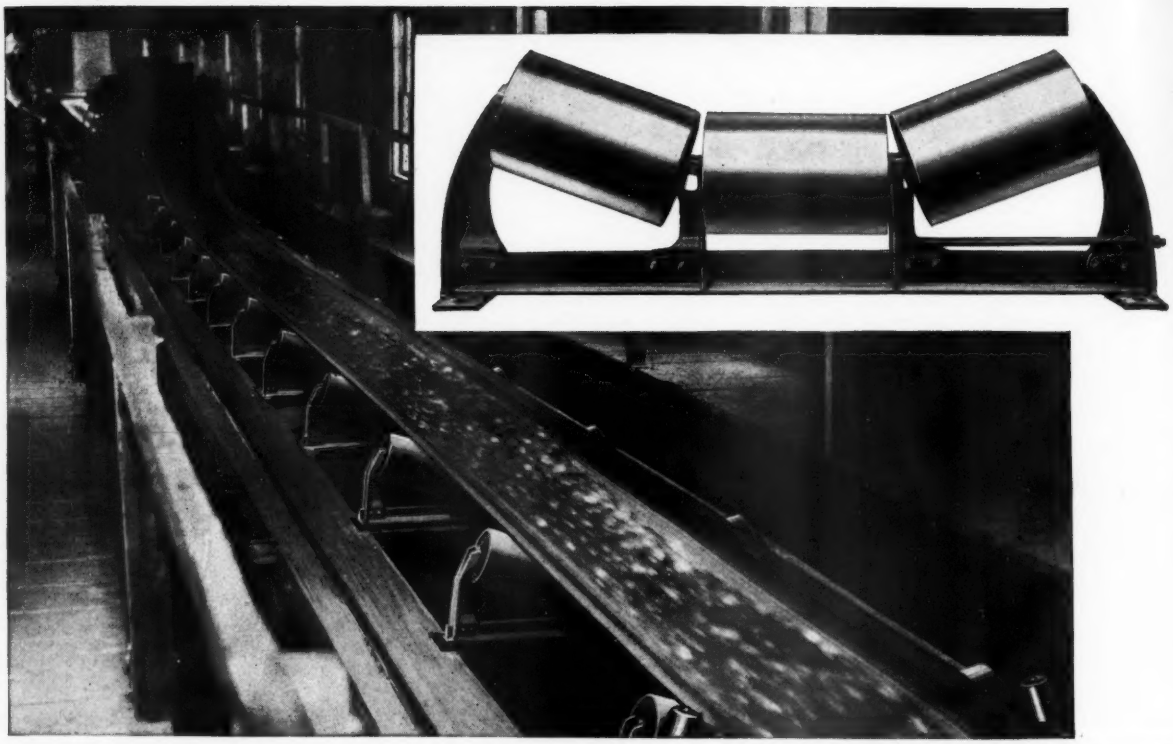
Mining CONGRESS JOURNAL

THE AMERICAN MINING CONGRESS

NOVEMBER 1948



Link-Belt Standardized Design Cuts Belt Conveying Costs

In the Link-Belt "100" series belt conveyor idlers, we believe that we have achieved the ultimate in design and performance, with evolution of engineering features progressively since 1896. These features cut conveying costs by reducing maintenance, giving longer service, and permitting the greatest simplification.

In addition to idlers, Link-Belt builds a great variety of standardized design conveyor elements and accessories such as: belt and apron feeders for uniform loading; trippers for intermediate discharge or distribution; drives using gears, reducers and chains; terminal machinery; supporting structures and enclosures.

We are at your service for complete conveyor systems, or individual equipment, to suit your requirements.

LINK-BELT COMPANY

Chicago 9, Philadelphia 40, Pittsburgh 13, Wilkes-Barre, Huntington, W. Va., Atlanta, Dallas 1, Minneapolis 5, Denver 2, Kansas City 6, Mo., Los Angeles 33, San Francisco 24, Cleveland 13, Indianapolis 6, Detroit 4, St. Louis 1, Seattle 4, Vancouver, Toronto 8.

11,211

LINK-BELT

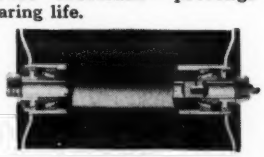
THE SYMBOL OF QUALITY — LINK-BELT

BELT CONVEYOR EQUIPMENT

IDLERS • TRIPPERS • BELTS • PULLEYS • BEARINGS • DRIVES

Grease-in—Dirt-out Seal

prevents harmful foreign matter from reaching bearings — conserves lubricant — prolongs bearing life.



Rolls

made with smooth rounded-edge outer shell of uniform thickness, and a full-length steel central tube, both continuous-welded to dished steel heads to form sturdy, well-balanced integral units.

Strong Brackets Support the Rolls

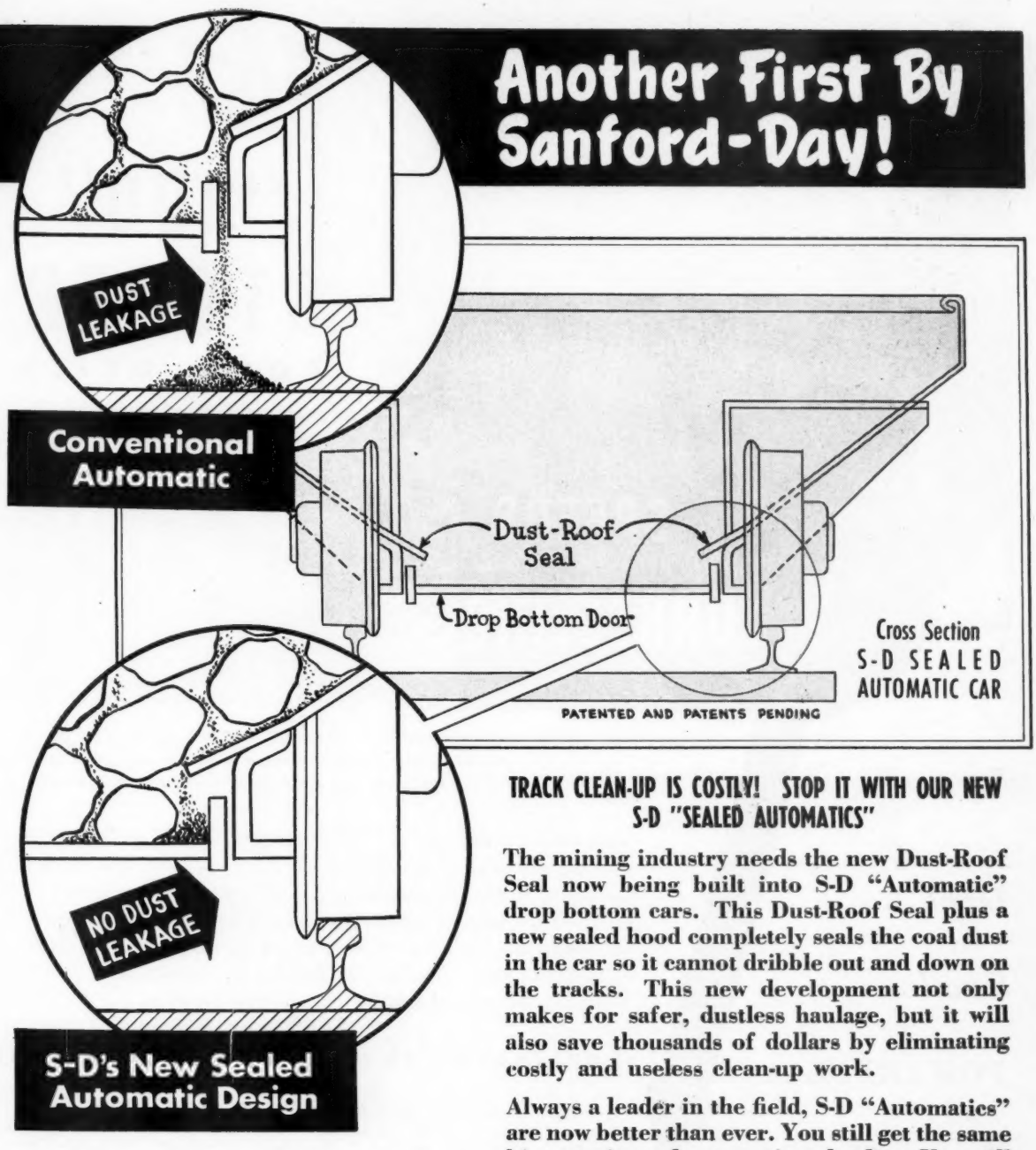
Supporting brackets are tough malleable iron in reinforced T-section to withstand load and impact.

Interlocking Nuts and Yokes Prevent Brackets from Spreading

Impact Idlers with Rubber Treads

Interchangeable with steel rolls this type provides a Cushion at loading points to protect idlers and preserve the belt — A good investment where heavy lump materials are handled.

Another First By Sanford-Day!



Above is a diagram that shows how you can keep dust off your tracks with the S-D "Sealed Automatic." In the circle at top left, is shown the conventional drop bottom construction and how dust shakes down and out through the clearance space between the door and the car frame. The lower circle shows how the new Dust-Roof Seal carries sifting dust across the open space, providing a 100% effective dust seal.

TRACK CLEAN-UP IS COSTLY! STOP IT WITH OUR NEW S-D "SEALED AUTOMATICS"

The mining industry needs the new Dust-Roof Seal now being built into S-D "Automatic" drop bottom cars. This Dust-Roof Seal plus a new sealed hood completely seals the coal dust in the car so it cannot dribble out and down on the tracks. This new development not only makes for safer, dustless haulage, but it will also save thousands of dollars by eliminating costly and useless clean-up work.

Always a leader in the field, S-D "Automatics" are now better than ever. You still get the same big capacity and automatic unloading. You still get our improved long-life construction and our foolproof "Jerkout" unlatching device that operates underneath the car. Now, with this revolutionary, money-saving SEALED construction, you get the best car the industry has ever known.

20 Car loads of "Automatics" from—

SANFORD-DAY IRON WORKS, Inc. • Knoxville, Tenn.

Thor "200" STOPER ROCK DRILL

SPEEDS TUNNELLING

LARGE TONNAGE PRODUCING MINES find Thor No. 200 Stoper "pays for itself" where over-head rock must be removed in tunnelling haulage roads for high speed movement of mechanized equipment.

Light . . .

Small . . .

POWERFUL . . .

Easy to Handle . . .

With automatic feed, *one* No. 200 Stoper gets the drilling done as fast as two crews with hand-held hammers! Many exclusive features are incorporated in the 75-pound Thor No. 200—automatic rotation . . . an exceptionally long-life chuck that permits swedging when worn . . . automatic oiling to *all* parts . . . closed side rod nuts . . . fully air cushioned piston . and oversize feed leg for stability. Call your Thor distributor for a demonstration.

INDEPENDENT PNEUMATIC TOOL COMPANY

Aurora, Illinois

Export Division: 330 West 42nd Street, New York 18, N. Y.

Birmingham Boston Buffalo Cincinnati Cleveland Denver Detroit Houston
Los Angeles Milwaukee New York Philadelphia Pittsburgh St. Louis St. Paul
Salt Lake City Seattle San Francisco Toronto, Canada Sao Paulo, Brazil London, England

Thor PORTABLE POWER TOOLS

PNEUMATIC TOOLS • UNIVERSAL AND HIGH FREQUENCY ELECTRIC TOOLS • MINING AND CONTRACTORS TOOLS

JULIAN D. CONOVER
Editorial Director

SHELDON P. WIMPFEN
Editor

Associate Editors
A. W. DICKINSON
G. B. SOUTHWARD
H. L. MOFFETT

Production
B. C. WILKERSON

Mining CONGRESS JOURNAL

Advertising
P. D. MCMURRER, Mgr.

FRANK W. MORAN
(Chicago)

RALPH F. DUYSTERS
(New York City)

RALPH W. HARKER
(Los Angeles and San Francisco)

Contents

VOLUME 34, NUMBER 11 FOR NOVEMBER, 1948

FRONT COVER—Huge Dragline at the Swamptown Stripping of Jeddo-Highland Coal Co. Moves 12,000 yd Each Day.

	Page
EDITORIAL	27
REARMAMENT AND INDUSTRIAL MOBILIZATION By MAJ. GEN. C. F. ROBINSON	28
THE ROLE OF RESEARCH IN THE DEVELOPMENT OF LABOR-SAVING EQUIPMENT AND METHODS By E. R. BORCHERDT	32
EXPERIENCES WITH CONTROL OF GOB PILE FIRES By HENRY F. HEBLEY	36
PHOTOGEOLOGY—A TOOL FOR MINERAL DEVELOPMENT By ROBERT C. STEPHENSON AND RICHARD M. FOOSE	39
SAN FRANCISCO MEETING MARKS GOLDEN ANNIVERSARY OF A. M. C.	43
Declaration of Policy	51
Digest of Convention Papers	58
COAL MINE POWER COSTS By G. B. SOUTHWARD	90
WHEELS OF GOVERNMENT	93
1949 COAL SHOW UNDER WAY	95
PERSONALS	97
NEWS AND VIEWS	99
MANUFACTURERS FORUM	110

Opinions expressed by authors within these pages are their own, and do not necessarily represent those of the American Mining Congress

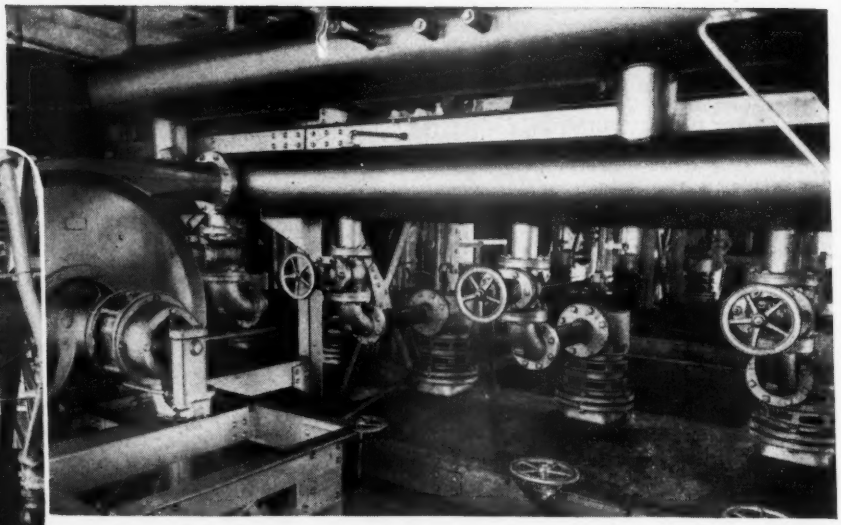
Copyright 1948, by

THE AMERICAN MINING CONGRESS
1102 RING BLDG., WASHINGTON 6, D. C.

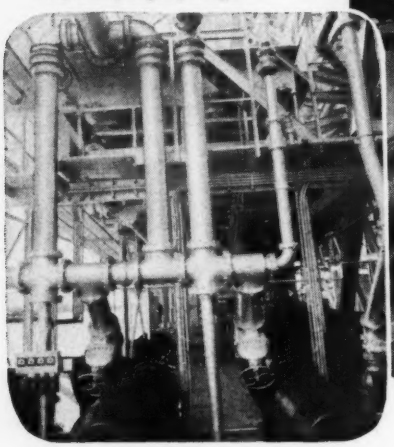
HOWARD I. YOUNG	DONALD A. CALLAHAN	ANDREW FLETCHER	JAMES D. FRANCIS	JULIAN D. CONOVER
President	*Vice President*	*Vice President*	*Vice President*	*Secretary*

Published Monthly. Yearly subscriptions, United States, Canada, Central and South America, $3.00. Foreign, $5.00. Single copies, $0.30. February Annual Review Issue, $1.00. Entered as Second-class Matter, January 30, 1915, at the Post Office at Washington, D. C.

ABC
Member Audit Bureau of Circulation



JIG PUMPS *on the world's largest tin mining dredge, equipped with Crane 12-in. Iron Body Gate Valves and 125-pound flanged fittings.*



WET CLEANING PLANT *showing air supply lines from centrifugal compressors to coal washing system. Valves and other piping materials are from Crane.*

You name it . . . CRANE supplies it . . . Everything in piping for mines

SEEPAGE PUMPS *in mine working under 1100-ft. head, equipped with 150-pound Crane steel gate and check valves, and fittings.*

Above ground or below . . . on new piping installations or for routine replacement work . . . the simplest way to get the piping you need is to specify Crane. One catalog gives you quick and easy selection from the world's most complete line of quality piping equipment. One order through well-stocked Crane Branches or Wholesalers supplies all valves, fittings, accessories, fabricated piping and pipe needed for the job.

When you standardize on this **Single Source of Supply,** you simplify all piping procedures—everything from design to erection to maintenance work. **Undivided Responsibility** for materials . . . brass, iron, steel or alloys . . . helps you to get better installations, avoids needless delays. And the **Unsurpassed Quality** of every item bearing the name Crane assures uniform dependability throughout every part of your piping systems.

CRANE CO., 836 S. Michigan Ave., Chicago 5, Ill.
Branches and Wholesalers Serving All Industrial Areas

EVERYTHING FROM . . .

VALVES
FITTINGS
PIPE

CRANE

PLUMBING
AND
HEATING

FOR EVERY PIPING SYSTEM

DISHING IT OUT... AND TAKING IT!

Fast, hard-slugging drilling is just one advantage of the Blue Brute WHC (Hand Crank) Drifter. It's also a specialist in "standing the gaff"— when the going couldn't be tougher.

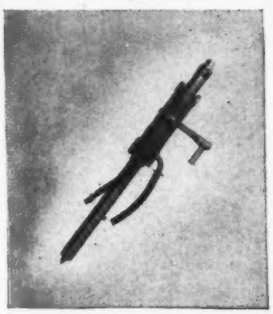
That's because the WHC is Worthington-built . . . with the rigid mounting, natural crank-handle throw and balanced action that mean easier handling... and the rugged, one-piece shell that keeps feed screw in constant alignment, for smoother over-all operation.

Features like these keep the WHC hitting cleaner and harder . . . allow it to short-stroke under heavy loads, reducing the stuck-steel nuisance . . . give it the guts for a long, trouble-free service life.

The same advantages, plus mechanical cranking are shared by the other Blue Brute Drifters — the WPMS (Pneu-Motor on Shell) and the WPM (Pneu-Motor on Drifter). And all three come in 3", 3½" and 4" sizes, *with standardized mountings.*

Know more about these and other cost-reducing, work-speeding BLUE BRUTES. Write for literature describing the complete line of BLUE BRUTE Mining Equipment, including Drifters, Stopers and Hand-Held Drills.

HB-22



BLUE BRUTE STOPER

Self-Rotating Model WR-31 is well balanced, easily handled and has many features that make it a favorite with mining men. Fully described and illustrated in Bulletin H-1200-B30.

BUY BLUE BRUTES

Semi-Portable Compressors. Portable Self-Priming Pumps. Drifters with Feed Motor Incorporated. Drifters with Feed Motor on Shell. Hand-Crank Drifters. Stopers. Hand-Held Rock Drills.

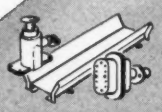
WORTHINGTON

Worthington Pump and Machinery Corporation, Worthington-Ransome Construction Equipment Division, Holyoke, Mass.

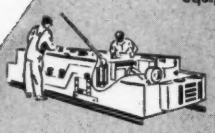
Distributors in all principal cities

At your Service...

National Mine Service Company

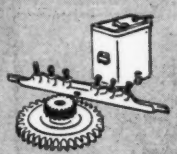


Distributors of original repair parts for JOY, SULLIVAN, LA-DEL equipment.



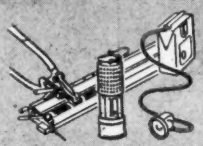
Building and rebuilding mine locomotives.

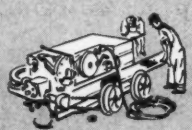
Motor rewinding and electrical repairs.



Manufacturers of cable reels, controllers, cable guides, locomotive headlights, trolley wire splicers, journal liners, replacement parts for mining equipment.

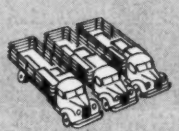
Exclusive distributors of WHEAT Electric Cap Lamps, KOEHLER Flame Safety Lamps, HAYDEN Belt Fastening Equipment.





Repair and rebuilding of mining machines and equipment.

Large stocks of mine supplies maintained at our five conveniently located warehouses.



Prompt pick-up and delivery service by regularly-routed trucks.

Our business is essentially one of *service*, furnishing the convenience of "off-the-shelf" buying and, in many sections, "to-your-door" delivery.

Extensive manufacturing, repairing, warehousing and distribution facilities are maintained. National's five divisions and divisional warehouses (two newly established within the year) are centrally located in principal coal producing fields. From them a large fleet of trucks operates on regular schedules. They deliver your orders, pick up repair work and simplify your maintenance, equipment and supply problems.

Call our nearest division office today and let us demonstrate what *real* service means.

Write for your copy of the National Stock Report.

NATIONAL MINE SERVICE COMPANY

Has the facilities . . . Delivers the goods

BEMECO DIVISION	ALL-STATE DIVISION	KENTUCKY-VIRGINIA DIVISION	ANTHRACITE DIVISION	WESTERN KENTUCKY DIVISION
Beckley, W. Va.	Logan, W. Va.	Jenkins, Ky.	Forty Fort, Pa.	Madisonville, Ky.

Direct field representatives covering the major coal producing areas.

For *STEPPED-UP* TONNAGE

NEW 30-TON MACK

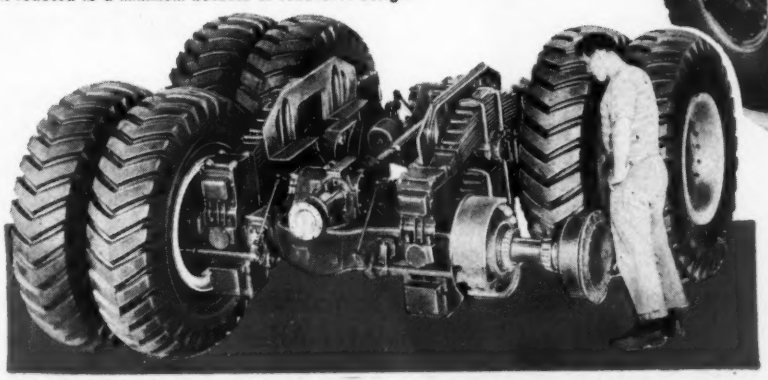
• Mack's new Model LRSW packs a 30-ton payload in its monster dump body — or pulls 55 tons as a tractor semi-trailer.

Big 275 h.p. super-charged Diesel keeps tonnage moving away from the shovels — fast. Massive frame is of alloy steel, reinforced and welded into one piece; built to stand up under the stiffest punishment. Mack's famed Balanced Bogie with exclusive Power Divider assures positive traction over difficult terrain and through slippery mud. Power steering and air-assist clutch mean easy handling, less driver fatigue, better maneuverability, safe and sure control. Roomy, all-steel cab has offset driver's seat for better vision.

No other off-highway truck offers you so many outstanding features and advantages. No other manufacturer but Mack designs and builds so many of its components in its own factories — your assurance of trucks that are perfectly co-ordinated for utmost efficiency.

Let us give you full information in terms of your particular operation. Write or call your nearest Mack branch or dealer.

Here's the famous Mack Balanced Bogie with the exclusive Power Divider which brings new standards of performance to off-highway hauling. Unusual flexibility and balance insure even tire loading, uniform braking and equal traction on all four wheels. Maintenance is reduced to a minimum because of functional design.



Mack

TRUCKS FOR EVERY PURPOSE

Mack Trucks, Inc., Empire State Building, New York 1, New York. Factories at Allentown, Pa., Plainfield, N. J.; New Brunswick, N. J., Long Island City, N. Y. Factory branches and dealers in all principal cities for service and parts. In Canada, Mack Trucks of Canada, Ltd.

THE JEFFREY MANUFACTURING COMPANY
958 North Fourth Street, Columbus 16, Ohio
CUTTERS • DRILLS • CONVEYORS • LOADERS • LOCOMOTIVES • JIGS • FANS

Above – Installation view of a high type Jeffrey Shuttle Car being loaded by mechanical loader.

Jeffery

Jeffrey Class 65 Cable Reel Shuttle Cars are built in three sizes, 30″, 35″ and 43″, with removable side boards being available for additional height and capacity.

All three sizes can be furnished with either four wheel drive and four wheel steering, or with two wheel

Shuttle Cars

drive and two wheel steer ing.

Four wheel drive cars have separate motor drives for front and rear wheels, a feature which results in equal loading of the traction motors.

Conveyor on all sizes is driven by hydraulic motor with variable speed control.

Steering, brakes, cable reel and elevating discharge are all hydraulically controlled, insuring quick and easy operation.

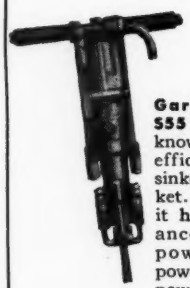
Complete information on request.

EVERY ONE DESIGNED TO CUT YOUR OPERATING COSTS

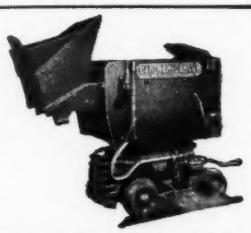
Gardner-Denver R94 Stoper—the *new*, lightweight (100 pound) self-rotating stoper. Perfectly balanced between high drilling speed and power of feed at all pressures. A powerful stoper—with working parts completely protected from sludge—it cannot "nose dive."

Gardner-Denver R104 Stoper—this famous, heavy-duty stoper has exceptionally high drilling speeds, perfect physical and operative balance. A favorite with drill runners whenever footing is precarious.

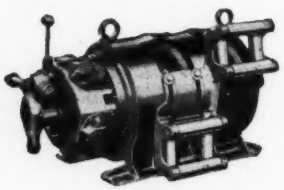
Gardner-Denver CF89H Drifter—the drifter with the "Built-in" self-adjusting feed. The speed of the drill responds *automatically* to bit penetration—the type of ground being drilled regulates the speed of feed. Practically vibration-free—easier on set-ups.



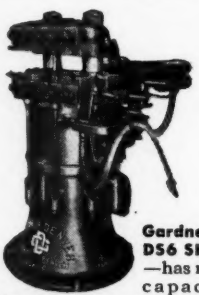
Gardner-Denver S55 Sinker—widely known as the most efficient 55-pound sinker on the market. A hard hitter, it has proper balance between air power, striking power and rotative power.



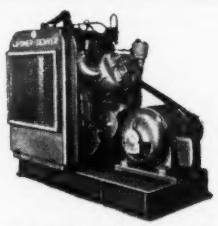
Gardner-Denver GD14 Loader—adjustable swing stops give this "Big Bite" loader a wide clean-up range. Two 5-cylinder radial air motors supply powerful crowd on minimum air pressure. Extremely low center of gravity an important safety feature.



Gardner-Denver HME Airslusher—a high torque 5-cylinder radial air motor develops extra rotative power—assures greater crowding even at low speeds. Controlled by a *single* throttle lever that can be operated by two fingers. Compactly built. Light in weight.



Gardner-Denver DS6 Sharpener—has maximum capacity for forging bits and shanks on largest sections of drill steel. Handles any standard size of hexagon, quarter octagon or round steel.



Gardner-Denver WB Vertical Water-Cooled Compressor—a two-stage compressor that meets the modern demand for a small machine having efficiency comparable to large horizontal compressors. *Two* small-diameter, low-pressure cylinders. Combination radiator and air-cooled intercooler.

Gardner-Denver HKK Safety Hoist—a lightweight, compactly built hoist of outstanding durability, especially designed to provide extra safety for the man and the load. Completely sealed gear train keeps oil sealed in, water and dirt sealed out.

For complete information, write Gardner-Denver Company, Quincy, Ill.

GARDNER-DENVER

SINCE 1859

Another GOODMAN LOCOMOTIVE *on the job*

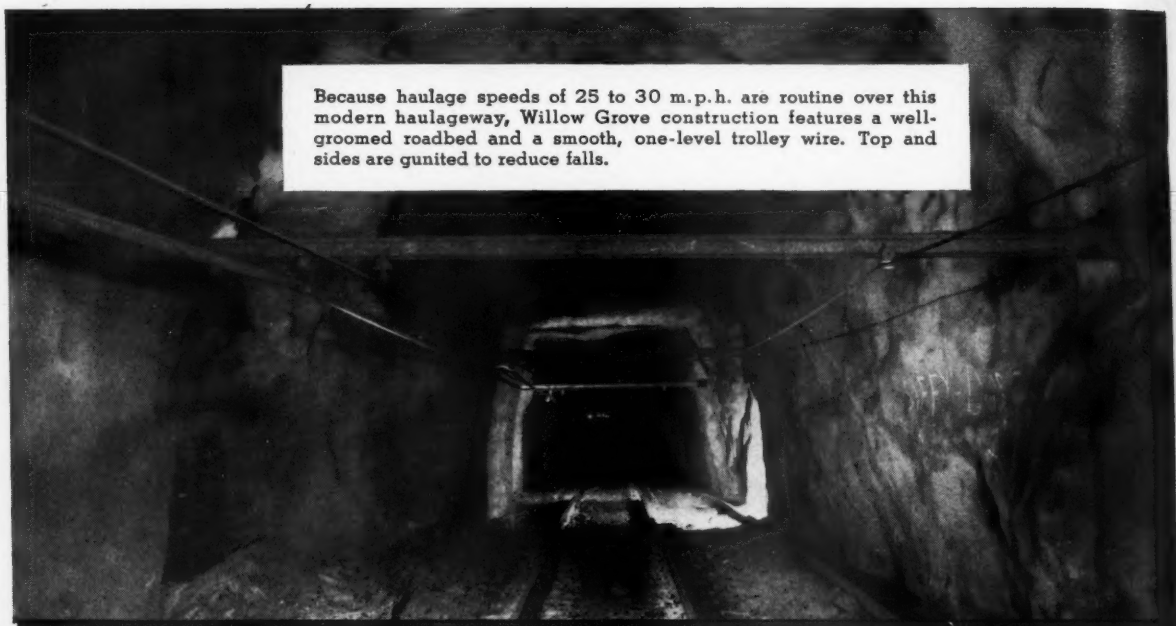
It's one of a fleet of 8 ton, 80 hp, gathering units operated on 24" gauge track by a large metal mine.

When next considering locomotives for your underground system call in a Goodman sales engineer. From a complete line of trolley, storage battery and combination types he can recommend units that will be profitable for you.

GOODMAN MANUFACTURING COMPANY

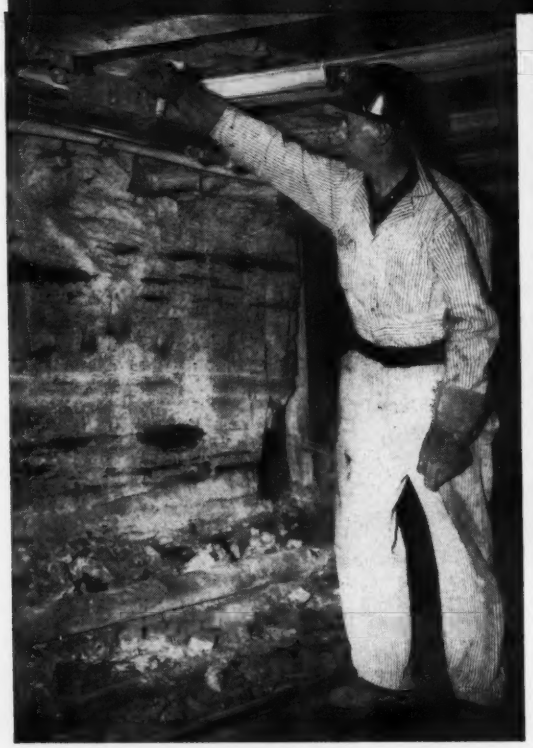
HALSTED STREET AT 48TH • CHICAGO 9, ILLINOIS

In England — UNITED STEEL COMPANIES, LTD.



Because haulage speeds of 25 to 30 m.p.h. are routine over this modern haulageway, Willow Grove construction features a well-groomed roadbed and a smooth, one-level trolley wire. Top and sides are gunited to reduce falls.

OVERHEAD MAINTENANCE AT WILLOW GROVE COSTS LESS THAN



A radio telephone system provides fast, easy communication between dispatcher and the various gathering motors.

Willow Grove places O-B Section Insulators in the wire at intervals of 1500 feet. This practice affords safe, fool-proof trolley sectionalization.

Flexible guard board is used at turnouts and other locations where men must cross under the wire.

One man walks Willow Grove haulageways every day, checking the system and noting points requiring maintenance. All necessary repairs are made promptly.

Good Materials, Properly Installed and Maintained, Promote Low-Cost Haulage at Modern Hanna Mine

Trolley haulage is doing a job at Willow Grove, modern Ohio mine of the Hanna Coal Company. Powerful 21-ton locomotives speed over its eight-mile main haul, making an average of 39 round trips every 24 hours. More than 800 loaded cars are pulled over its length daily. Yet in spite of this hard service, overhead maintenance costs average less than .011 cents per ton-mile. Other costs are proportionately low.

Hanna does not skip on maintenance, either. One man walks the track daily, looking for worn spots. All necessary repairs are made immediately. One important reason for the low costs can be traced to Hanna's policy of using only top-quality materials in the first place. These are installed carefully and properly to insure maximum performance. Regular maintenance tells the rest of the story.

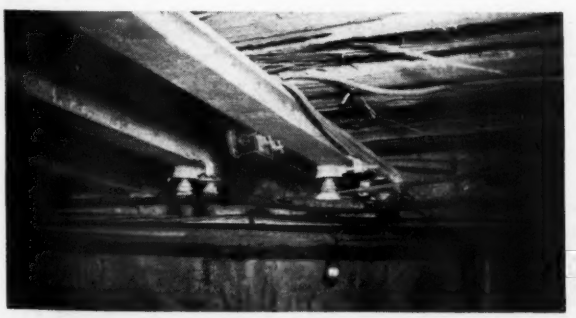
The same policy can insure dependable, low-cost transportation at your mine. It is as simple as one, two, three — good materials *plus* good installation *plus* good maintenance *equals* good trolley haulage. Why not put this program into effect at your mine?

Ohio Brass

MANSFIELD, OHIO

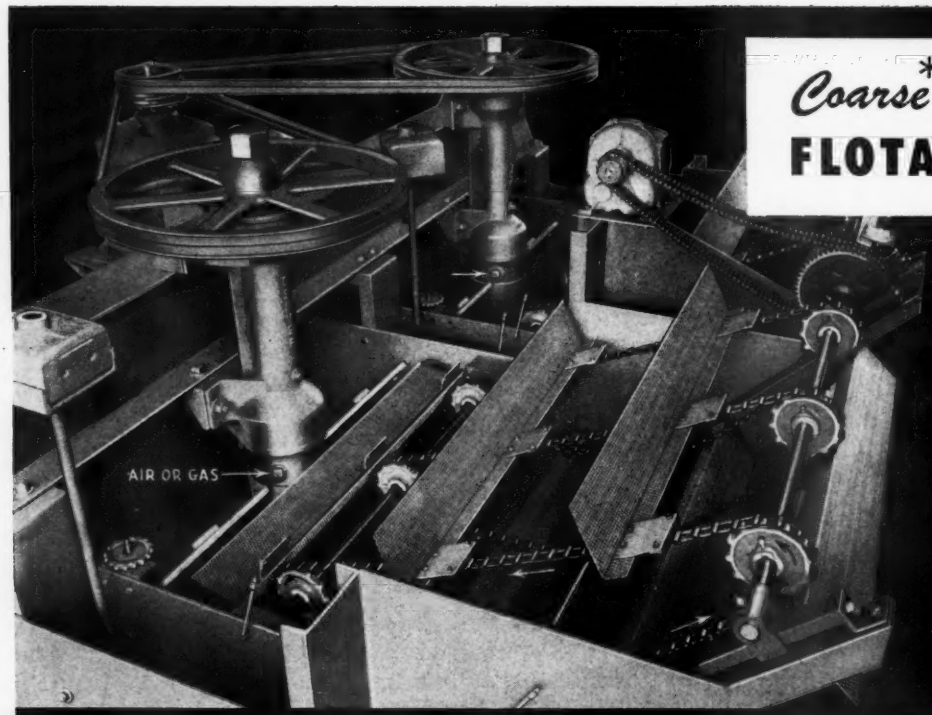
Canadian Ohio Brass Co., Ltd., Niagara Falls, Ont.

2819-M



Trolley is suspended from steel timbers by O-B I-Beam Hangers and Bulldog Clamps. Because the timbers are kept at a uniform height, the trolley wire stays at one level.

An O-B Dead-End Assembly takes up the cable strain at lead-ins to O-B Safety Feeder Switches.



Coarse* COAL FLOTATION

Working directly with the Bureau of Mines Coal Preparation Section, and with large coal companies engaged in solving the problem, Denver Flotation Engineers designed a Flotation Machine which does an effective job of coal cleaning as will be noted in the tabulations below from Bureau of Mines Report of Investigations 4306, July 1948.

Marketable results are obtained on varying types, grades and sizes of coal fractions.

with DENVER "SUB-A" FLOTATION MACHINES

PROBLEM • Treating coal fractions from 1/16"-0. Two objectives are sought—

1) *to save marketable grade of coal in these sizes and*

2) *eliminate stream pollution from wasted slurry water.*

These coal fractions cannot be satisfactorily cleaned by "gravity" methods. With flotation remaining as the most acceptable solution, a prime consideration is that the flotation machine used must be capable of handling both coarse and fine sizes effectively. The rapid rising, dense agglomerate type "matte" coal concentrate must be removed and dewatered in large volume.

SOLUTION • No commercial flotation machine can treat both coarse and fine sizes so effectively as the Denver "Sub-A." This selective feature plus its extreme mechanical and metallurgical flexibility makes it the logical choice for coal cleaning work.

Removal and dewatering of the dense agglomerated "matte" concentrate was accomplished with special "deep-digging" punched plate rakes which carry the 7"-8" coal matte up the spitzkasten allowing surplus water to drain back in the pulp through the perforated rakes. Further dewatering is carried out in a wedge bar compression screw conveyor. Surplus water returns via middling feed pipe to the Denver "Sub-A" Flotation cell for re-use, thus eliminating surplus slurry water.

	SCREEN SIZE, MESH	FEED		CLEANED COAL		REFUSE		DISTRIBUTION, %		Reagents, lbs. per ton feed
		Weight, percent	Ash, 1* percent	Weight, percent	Ash, 1* percent	Weight, percent	Ash, 1* percent	Cleaned Coal	Refuse	
MINE I *	10 to 14	18.8	11.9	23.0	6.2	9.1	31.6	77.6	22.4	Kerosene, 3.27
	14 to 35	51.4	19.1	56.0	7.6	31.9	65.3	80.1	19.9	B-23 Frother, 0.24
	35 to 100	23.3	40.3	17.0	13.4	35.6	81.8	60.7	39.3	Pine Oil, 0.11
	Through 100	6.5	58.3	4.0	19.3	23.4	84.0	39.7	60.3	
	Composite through 10	100.0	25.2	100.0	8.7	100.0	72.5	74.1	25.9	
MINE II *	10 to 35	64.2	10.5	58.2	3.4	54.0	50.7	85.0	15.0	Kerosene, 3.46
	35 to 100	22.6	10.5	26.9	4.6	22.2	66.2	90.4	9.6	B-23 Frother, 0.26
	Through 100	13.2	12.8	14.9	6.3	23.8	64.8	88.9	11.1	Pine Oil, 0.20
	Composite through 10	100.0	10.8	100.0	4.2	100.0	57.5	87.6	12.4	

1*—Moisture free basis

CONSULT WITH YOUR DENVER "FLOTATION ENGINEERS"

"The firm that makes its friends happier, healthier and wealthier"

DENVER EQUIPMENT 24 HOUR SERVICE COMPANY

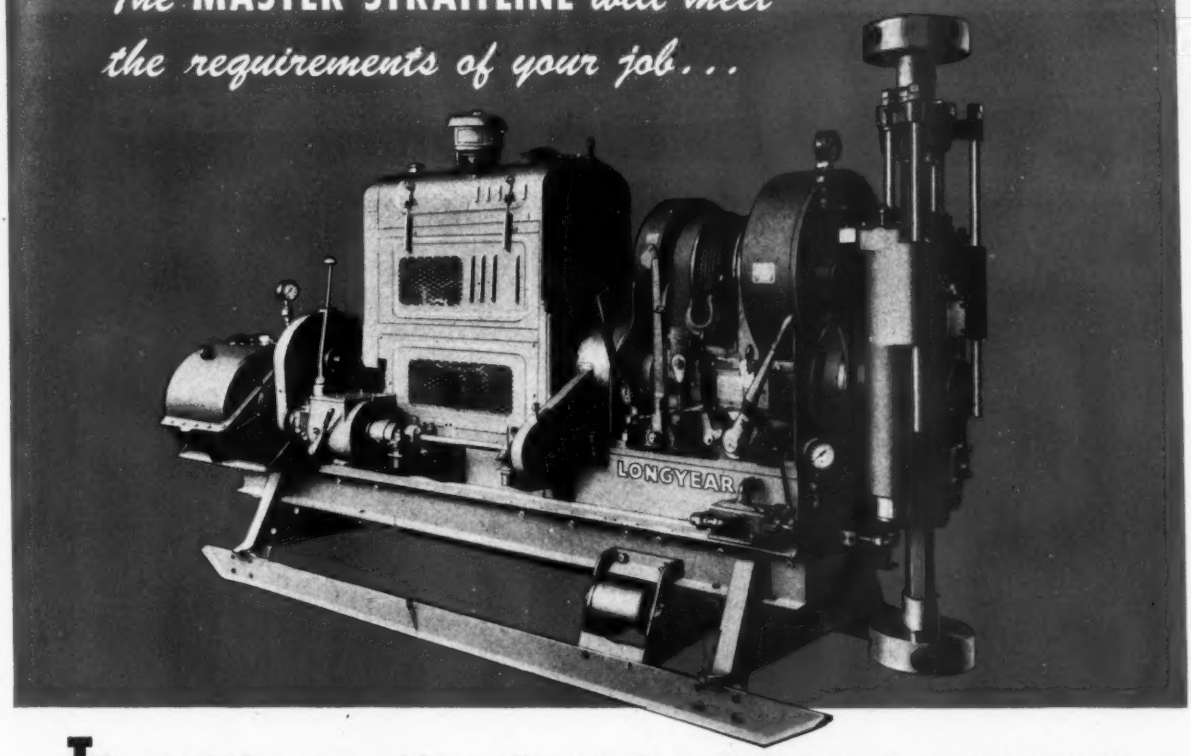
DENVER EQUIPMENT COMPANY

P. O. BOX 5268 • DENVER 17, COLORADO

DENVER • NEW YORK CITY • CHICAGO • TORONTO • VANCOUVER • MEXICO CITY • LONDON • JOHANNESBURG • RICHMOND, AUSTRALIA

DEEP CORE DRILLING?

The **MASTER STRAITLINE** *will meet the requirements of your job...*



This powerful Longyear model is a self-contained, completely equipped assembly ready for action on your job. Strength and endurance are built into the drill, resulting in steady performance. Drilling and upkeep costs remain low. The Master has a rated capacity of 4250' of 1⅛" core. Larger cores may be recovered, but to somewhat lesser depths.

POWER—Diesel, gasoline, electric, or air motive units can be supplied. Either one delivers an abundance of power for the rigorous demands of deep drilling.

SWIVEL HEAD—The hydraulic head will drill holes at any desired angle. It is operated by a built-in oil pump. This provides sensitive control of the bit and drill stem as the drilling progresses. Sound design and careful construction reduce vibration, thereby increasing the life of the diamond bit.

HOIST—A sturdy, built-in hoist handles the heavy weight of rods. Four speeds are available for the hoist, or for drilling.

The Longyear Master Straitline will successfully handle the exacting demands of your deep drilling. Many users have demonstrated its power, endurance, and steady drilling performance. Put a Master on your job!

BULLETIN NO. 77 GIVES FULL PARTICULARS. WRITE FOR IT.

E. J. LONGYEAR COMPANY

MINNEAPOLIS, MINNESOTA, U.S.A. NEW YORK OFFICE, 1775 BROADWAY

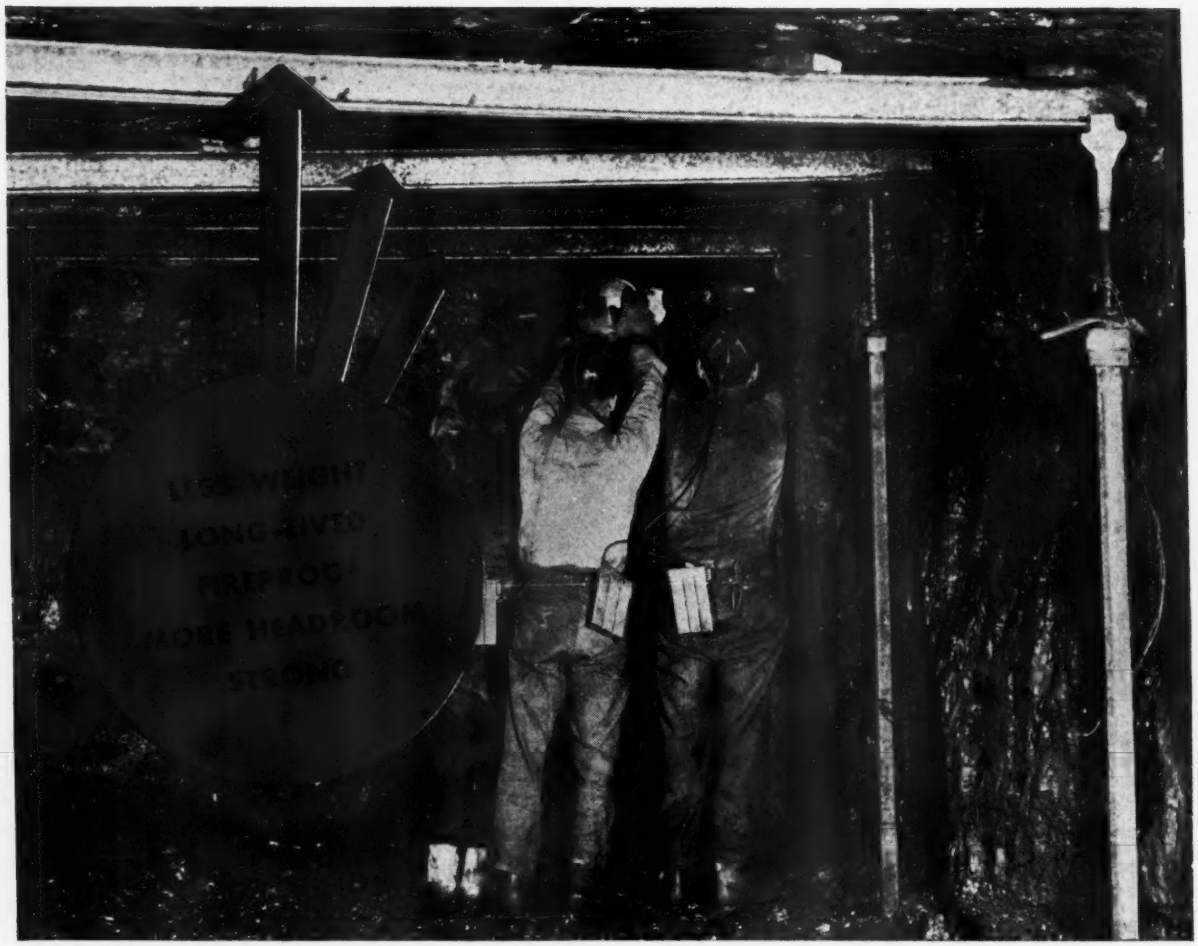
CANADIAN LONGYEAR, LIMITED, NORTH BAY, ONTARIO, CANADA

DIAMOND CORE DRILLS • CONTRACT CORE DRILLING
SHAFT SINKING • GEOLOGICAL INVESTIGATIONS

REPRESENTATIVES IN PRINCIPAL MINING CENTERS IN THE UNITED STATES AND OTHER COUNTRIES

LIGHTWEIGHT, LONG-LIVED, TROUBLE-FREE

Alcoa Aluminum Beams for Your Working Faces



Miners lift less dead weight when they set Alcoa Aluminum Header Beams at the working faces. Aluminum beams weigh less than ½ as much as steel or oak beams of equal strength. You can use Alcoa 61S-T6 Aluminum Header Beams again and again. They are long-lived . . . need no painting. Are fireproof and rotproof.

Although immediate delivery is not possible, due to the current metal shortage, you can lay your plans for lightweight timbering. Figure now on reducing timber weights and production costs in the future. ALUMINUM COMPANY OF AMERICA, 1478 Gulf Building, Pittsburgh 19, Pennsylvania. Sales offices in 55 leading cities.

ALCOA ALUMINUM

IN EVERY COMMERCIAL FORM

Designed for Digging

Working with the intimate knowledge of field problems that comes only from years of experience and with ample modern facilities for research and manufacture at their command, Bucyrus-Erie engineers are in an unequalled position to design machines scientifically adapted to the work to be done. Every part of a Bucyrus-Erie, whether made in our own shops and foundries or purchased from an outside supplier, must pass our rigid laboratory tests before being released for production.

Study the design of a modern Bucyrus-Erie, watch the smoothness with which the machine works, and you will readily recognize that there are no design "compromises" to pile up power consumption, result in excessive maintenance, or reduce output. From the ground up, Bucyrus-Eries are designed for digging. That's why leading operators all over the world say that Bucyrus-Eries are "years ahead."

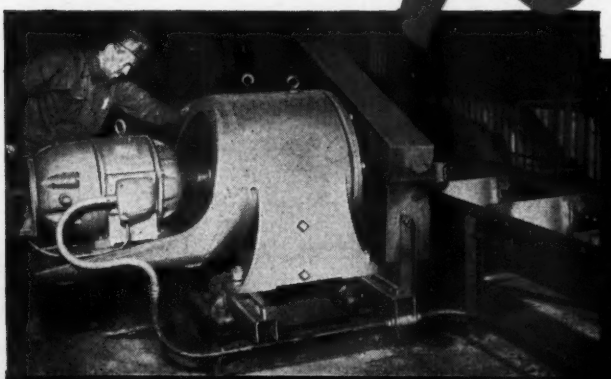
Modern electric furnaces in our own foundries . . . one of the facilities permitting full scope for design.

4L45

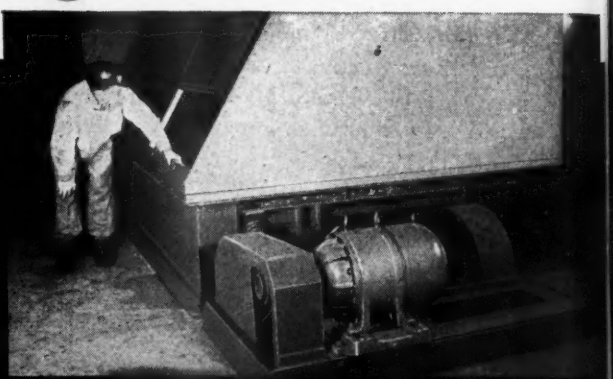
BUCYRUS ERIE

SOUTH MILWAUKEE, WISCONSIN

Availability for Service: 100%!



▲ Here a Tri-Clad totally enclosed, fan-cooled motor drives one of the plant's conveyors. Other G-E motors run washers, vibrators, sizing screens.



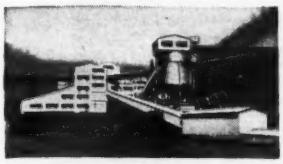
▲ Here a Tri-Clad motor drives an air table. G-E motors in this plant have operated constantly with little or no maintenance, since early 1946.

This load center unit substation is one of two 1500-kva G-E units which step down 6900-volt power to 480 volts. G-E substations ▼ are compact, ready-to-install.

Equipment

... to cut coal-handling costs per ton!

In this ultra-modern colliery, G-E Tri-Clad motors work 90 hours per week, with practically no maintenance—power costs average only $.021 per ton.



Two and a half years ago, the Dorrance Colliery of the West Virginia Coal and Coke Company was put in service as part of the Company's multi-million dollar modernization program.

In choosing motors to drive the processing machinery—most of which is located in dusty atmospheres—the operators wanted maximum protection against corrosive effects and clogging action of dust and dirt, which can cause equipment shutdowns. That's why they selected General Electric totally enclosed, fan-cooled motors—more than 90% of the 200 motors installed. These G-E motors—most of them of Tri-Clad* construction—have since run up a record of *100%* service availability.

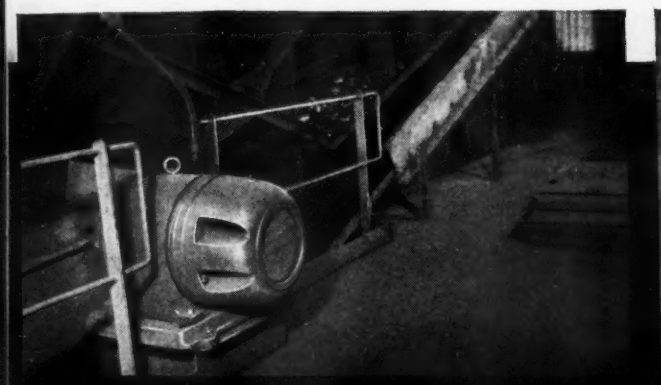
Also contributing to the colliery's high production are its modern G-E unit substations installed at strategic points to maintain operating continuity and assure full voltage at the motors.

For close co-ordination of the entire plant operation and for most efficient utilization of manpower, control of all motors is centralized in three G-E Cabinetrol* units.

As a result of the efficient use of electricity throughout the plant, the colliery handles 800 tons of R.O.M. coal per hour, and power costs have been kept down to only $.021 per ton.

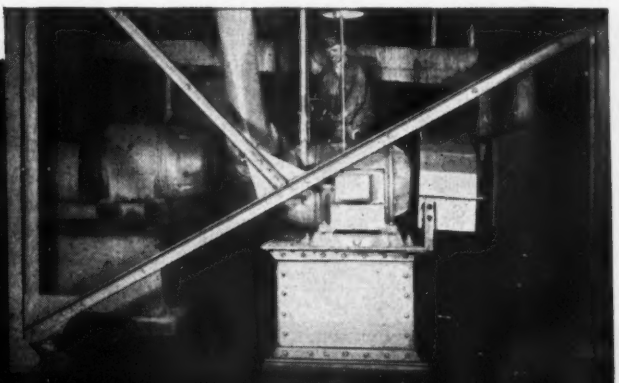
G-E engineers, thoroughly familiar with coal mining and preparation, can help you apply the properly co-ordinated electric equipment to cut your maintenance and power costs. As a first step, call the G-E office nearest you. ***Apparatus Dept., General Electric Company, Schenectady 5, N. Y.***

**Reg. U.S. Pat. Off.*



▲ Dust in the atmosphere around this shaker screen does not affect this Tri-Clad totally enclosed fan-cooled motor.

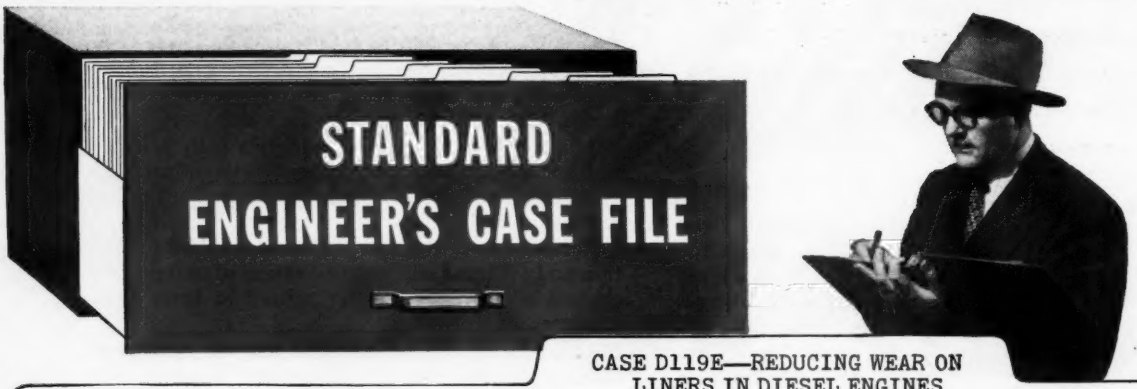
Here a 750-kva G-E unit substation, 6900-2400 volts, supplies power to a rotary converter in a drift mine as well as to an ▼ aerial tramway.



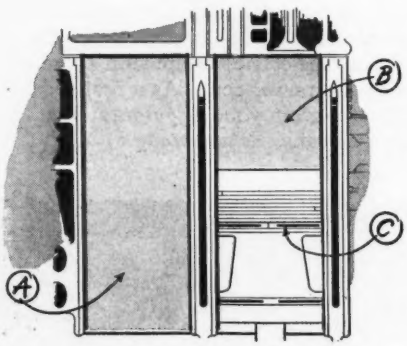
▲ Only routine inspection has been needed on this colliery's G-E motors since their installation. Shown are two Tri-Clad motors in the pump room.

This G-E Cabinetrol assembly is one of three master control sections in the plant. G-E metal-clad motor-starter units protect personnel, save installation time. ▼

GENERAL ELECTRIC



CASE D119E—REDUCING WEAR ON LINERS IN DIESEL ENGINES



DIESEL ENGINE LINERS AND PISTON

In high-speed Diesel engines lubricated with RPM DELO Diesel Engine Lubricating Oil, wear on liners was held to a minimum with little variation over their entire areas. A constant lubricating film was maintained on them even in high-temperature belts. RPM DELO Oils are recommended for all types of Diesels. Come in all viscosity grades necessary for your engines.

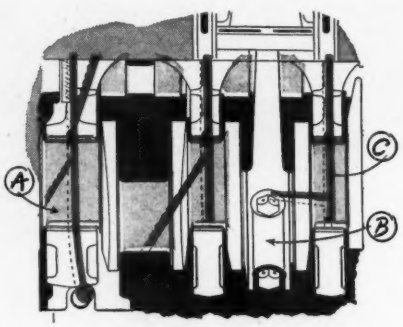
A. Special additive provides metal-adhesion qualities...keeps oil on all parts whether hot or cold, running or idle.

B. An anti-oxident resists formation of lacquer—resistance to extreme heat provides lubrication in the toughest conditions.

C. Contains detergent which keeps rings clean and operating freely...prevents scratching and gouging of liners.

RPM DELO Diesel Oil will not corrode any bearing.

CASE D119F—PROLONGING THE LIVES OF BEARINGS IN DIESELS



SECTION OF DIESEL ENGINE CRANK AND CAM

No bearing failures occurred between overhaul periods in Diesel engines used in the toughest service when they were lubricated with RPM DELO Diesel Engine Lubricating Oil.

A. Non-corrosive to all types of bearing metal...inherent ability of base stocks and added compound resist oxidation and formation of acid which is common cause of bearing corrosion.

B. Maintains a tough lubricating film which withstands excessive shocks and pressures.

C. Special detergent compound keeps oil passages clean and open - allows free flow of lubricant to vital points.

Another compound in RPM DELO Oil prevents foaming of the oil. An accurate measurement of crankcase levels can always be obtained.

For additional information and the name of your nearest Distributor, write

STANDARD OIL COMPANY OF CALIFORNIA

225 Bush Street, San Francisco 20, California

The California Oil Company
Barber, New Jersey

The California Company
17th and Stout Streets, Denver 1, Colo.

Standard Oil Company of Texas
El Paso, Texas

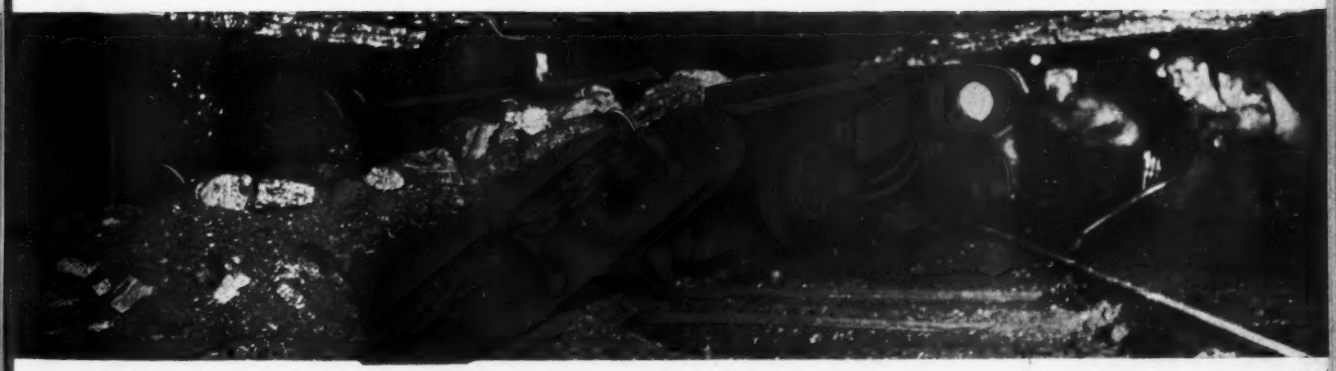
DIESEL ENGINE RPM DELO LUBRICATING OIL

Trademarks Reg. U. S. Pat. Office

For fast and thorough clean up on both . . .

HIGH COAL

and LOW COAL

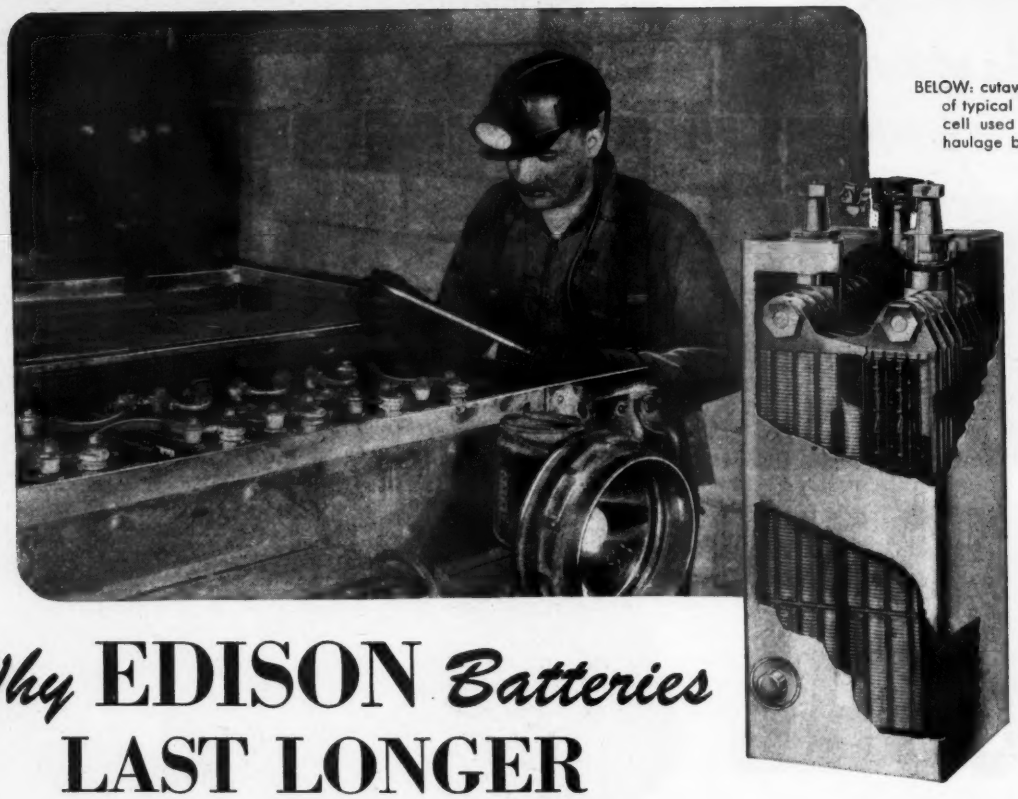


THE CLARKSON *Redbird*

TYPE 24 BB UNIVERSAL LOADER

Get the details for <u>your</u> operation

The CLARKSON MANUFACTURING CO.
Nashville
Illinois



BELOW: cutaway view of typical EDISON cell used in mine haulage batteries.

Why EDISON *Batteries* LAST LONGER

WHAT enables an EDISON Battery to stay on the job, out of the repair shop—to see a mine locomotive or shuttle car through its strenuous duty day after day, year after year with maximum dependability? What makes an EDISON Battery give long life and low haulage cost in spite of the hardest usage?

One of the many answers is its rugged, precise cell construction. Cell containers, covers, pole pieces and other structural parts are made of STEEL. Even the active materials are permanently locked in perforated STEEL tubes and pockets. These in turn are securely assembled into STEEL grids to form the negative and positive plates. Every STEEL cover is welded to its container, proof that no internal trouble is anticipated for the normal life of the cell.

Case histories show that EDISON Batteries in mine haulage service have fallen down shafts and gone through many wrecks with little or no damage . . . *and still delivered their full service life.* The fact that they can withstand such accidents indicates the extra dependability that can be expected of them under more normal conditions.

EDISON
Nickel • Iron • Alkaline
STORAGE BATTERIES

ADVANTAGES OF EDISON NICKEL-IRON-ALKALINE BATTERIES:

They are durable mechanically; can be charged rapidly; withstand temperature extremes; are foolproof electrically; can stand idle indefinitely without injury; are simple and easy to maintain.

EDISON STORAGE BATTERY DIVISION OF THOMAS A. EDISON, INCORPORATED, WEST ORANGE, N. J.
In Canada: International Equipment Company, Ltd., Montreal and Toronto

GOODMAN *TYPE 99* UNDERGROUND BELT CONVEYORS

FOR METAL MINE SERVICE

An extendable conveyor specially designed and built for moving heavy ore any practical distance. Bolted "knockdown" type of design provides strength yet permits quick installation or extension. Any member of an intermediate section can be easily handled and compactly stored. In assembly, patented butt end side plates of the intermediate sections assure continuous alignment and carry compression through joints over uneven bottom. It is not necessary to anchor the Type 99.

ASK A GOODMAN SALES ENGINEER *for details of a conveyor in the Type 99 series to suit your mine conditions.*

GOODMAN MANUFACTURING COMPANY • HALSTED STREET AT 48TH • CHICAGO 9, ILLINOIS

In England: *UNITED STEEL COMPANIES, LTD.*

THE TIGER BRAND SPECIALIST SAYS—
"If your wire
USS
AMERICAN
TIGER BRAND
WIRE ROPE
UNITED STATES STEEL

rope takes a beating like this, you ought to check the application"

"The foreman on this job was blowing his top. He was already behind in production when this machine went down. He swore that the wire rope was no good.

"We took a look at the sheaves. They were badly worn. Then I asked him, 'When did you check those grooves?' Nobody on the job could remember when the sheaves had been regrooved.

"We got out a gage. Sure enough, that's where the trouble was. The grooves had worn down so that the proper size gage nowhere near bottomed. Now they're regrooving and I sold him on the idea of letting me check all his equipment. I'll bet we keep his business and his ropes will give twice the service."

AMERICAN STEEL & WIRE COMPANY, GENERAL OFFICES: CLEVELAND, OHIO
COLUMBIA STEEL COMPANY, SAN FRANCISCO
TENNESSEE COAL, IRON & RAILROAD COMPANY, BIRMINGHAM
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

Are you sure you have the RIGHT wire rope for your job!

Are you convinced beyond a doubt that your wire ropes are operating at the lowest obtainable unit cost?

Are you sure that your equipment is contributing fully to long, safe rope life?

If not, you should have a check-up by a TIGER BRAND Specialist—a thoroughly experienced field service engineer.

To show you how the proper application of wire rope can save you money, we have prepared a new booklet to help you check your own operating conditions.

SEND FOR NEW FREE BOOKLET

American Steel & Wire Company
Rockefeller Building, Dept. N-11
Cleveland 13, Ohio

Gentlemen:

Please send me a copy of your booklet, "Valuable Facts about the use and care of Wire Rope."

Name.....

Company.....

Position.....

Address.....

USS

AMERICAN TIGER BRAND WIRE ROPE

Excellay Preformed

UNITED STATES STEEL

Another new mine to produce 4,000 tons daily with modern cars on Timken® bearings

TO help speed production in their new Deerfield Mine, Wyoming County, near Mullens, W. Va., American Coal Company is equipping their new mine cars with Timken tapered roller bearings. 100 of these cars are already hard at work—100 more are on order with more to follow, to enable them to reach a peak production of 4,000 tons of No. 3 Pocahontas coal daily. In this operation, the cars are dumped on the inside of the mine by means of a rotary-type dump as shown; the coal is then conveyed up to the tipple on a Timken bearing equipped belt conveyor.

Timken bearings normally outlast the mine cars in which they are used. They assure easier starting and permit faster operation, reduce friction to a minimum and save considerable lubrication and maintenance time.

With Timken bearings on the axles, the number of loaded cars in a train can be considerably increased. Power costs are cut.

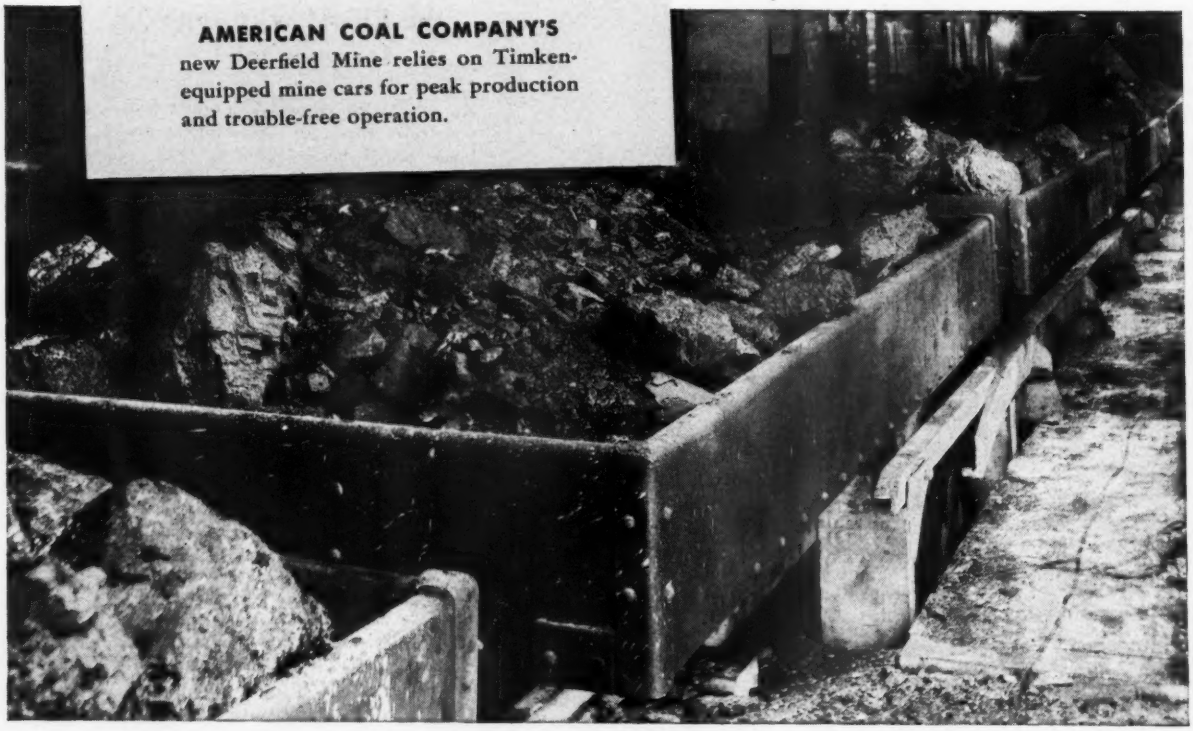
Tapered construction and line contact between rolls and races enables Timken bearings to take the heaviest radial and thrust loads in any combination. Lubricant is kept *in*, dirt, grit and moisture *out* because Timken bearings permit and maintain effective closures.

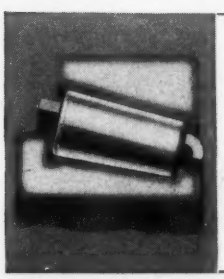
To insure peak production at minimum cost in *your* mine insist on Timken bearings in every new mine car you buy. And always look for the trade-mark "Timken" on the bearings you use. The Timken Roller Bearing Company, Canton 6, Ohio. Cable address: "TIMROSCO".

TIMKEN BEARING EQUIPPED

This symbol on a product means its bearings are the best.

AMERICAN COAL COMPANY'S new Deerfield Mine relies on Timken-equipped mine cars for peak production and trouble-free operation.





GREATER LOAD AREA

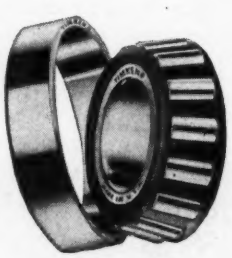
Because the load is carried on the *line* of contact between rollers and races, Timken bearings carry greater loads, hold shafts in line, wear longer.

The Timken Roller Bearing Company is the acknowledged leader in: 1. advanced design; 2. precision manufacturing; 3. rigid quality control; 4. special analysis steels.

TIMKEN

TRADE-MARK REG. U. S. PAT. OFF.

TAPERED ROLLER BEARINGS



NOT JUST A BALL ○ NOT JUST A ROLLER ▭ THE TIMKEN TAPERED ROLLER ▭ BEARING TAKES RADIAL ◎ AND THRUST →◎← LOADS OR ANY COMBINATION ✳

★ Mining CONGRESS JOURNAL ★

Published for the Entire Mining Industry
by the American Mining Congress
SHELDON P. WIMPFEN, Editor
NOVEMBER
VOLUME 34 1948 NUMBER 11

Mineral Intelligence

MILITARY leaders are always faced with the problem of the proper interpretation of intelligence—the knowledge of events or circumstances relating to the enemy. Likewise, mineral economists have a thorny problem when they undertake to project available statistics into terms of mineral self-sufficiency at this or any future date.

It will probably never be possible to forecast definitely the undiscovered mineral wealth of the nation. Conclusive information is only available on those ore bodies that exist today as barren-walled holes in the ground. Operating mines with capable geologic staffs employ proper caution when reserves are mentioned. Good practice dictates limited development to avoid costly maintenance on non-producing areas. Mining companies frequently lack complete geological and historical data on their properties because it has not been economic to gather such information. Companies are often reluctant, and understandably so, to reveal information which, in certain hands, could damage their interests. Hence, data on operating mines is deficient. This is true to a far greater extent for the thousands of mineral deposits in this country that are not being actively mined.

A further hazard to any "guestimates" regarding our mineral position is the impossibility of determining the cost of production, the price of product, and the spread between them at any future date. These factors are the final arbiters in resolving the difference between a mineral deposit of only academic interest and one of economic importance.

The report on known "Mineral Resources of the United States," published as a joint effort of the staffs of the U. S. Bureau of Mines and the Geological Survey, constitutes valuable mineral intelligence in that it sheds some light on the mineral resource problem. In conjunction with the U. S. Bureau of Mines, the Geological Survey has recently established a mineral resources unit to conduct and maintain a continuous appraisal and compile data for similar reports. Like the original survey, future reports cannot be considered an "inventory" but will be subject to the same limitations as the original effort in this difficult field.

Two-Way Privilege

THE interchange of technical knowledge has long been, and will continue to be, one of the cardinal canons of mining progress. Operators of coal, metal, and nonmetallic mines give freely of their time and energy in making available to others the results of their individual efforts. Increased efficiency, lower costs, higher output per man, and a better standard of living are among the results of "spreading the word."

But to a large degree this informative exchange has been confined to within the coal, metal, and nonmetallic groups and has not been sufficiently evident between these respective branches of the industry. All mine operators have the same objective—to make our mineral wealth available for use. Many of their production, economic, and administrative problems are similar. However, comparatively few mining men have taken full advantage of the benefits to be gained from trading technical information with those engaged in other branches of the industry.

Some mining companies have adopted the policy of sending key operating men on tours covering diversified types of mining and others follow the practice of sending their operating men to mining conventions to obtain first-hand knowledge, whether or not the convention is primarily concerned with coal or with metals and nonmetallic minerals. The biennial expositions of coal-mining and of metal and nonmetallic-mining equipment have real educational value for those engaged in all types of mining.

Some evidence of the results that may be obtained from reciprocal exchange of information is apparent.

Among practices that first budded on one limb of the industry to be successfully transplanted to another are the use of shaking conveyors, first applied to coal mining, in both ferrous and nonferrous metal mines; shuttle cars in bauxite mines; and cutting and loading machines in potash mines. On the other hand, several metallurgical practices including flotation and various gravity methods of separation were developed to a high degree at metal mines to be adopted later by coal mines. In the field of open-pit mining much information has been exchanged to mutual advantage.

Recently, two sponsored trips gave a clear indication of the community of interest that can and should exist between coal and metal mine operators. A representative group of anthracite men visited mines on the Mesabi Range of Minnesota and shortly afterward the iron mining men inspected anthracite strip operations in the vicinity of Hazleton, Pa. On both trips keen interest was shown in how the other fellow did the job. This is a full stride on the march of progress with each leg of the industry knowing more about the steps the other leg is taking. Let's have more of it.

Military equipment manufacture consumes huge quantities of special steel

Rearmament and Industrial Mobilization

Advance Preparation to Meet Military and Civilian Wartime Needs Aim of National Security Resources Board

MAJ. GEN. C. F. ROBINSON

Executive Officer
National Security Resources Board

METALS and minerals are the basic ingredients for our large and still expanding industrial plants. This dependency of modern industrial civilization on metals has never been greater and there is every indication of it increasing. In turn, our ability to wage a successful war, should that unhappily occur again, is in direct proportion to the soundness of our economic system. The basis of our modern Army, Navy and Air Force is industrial production. It is peculiarly so for this country.

In the United States, with approximately half of the world's productive capacity, and less than 7 percent of the world's population, we must necessarily plan to wage war with an overwhelming superiority in the quantity and quality of military weapons, all of which use a variety of minerals and metals in one form or another. The modern military machine is only as mighty as the supply and utilization of the minerals which provide the weapons. Thus, the future destiny of our country and our national security to a great degree lies in a wide national minerals policy.

As a result of the experience and lesson of World War II, the National Security Resources Board was created by the National Security Act of 1947 to coordinate military, industrial, and civilian mobilization. The Board, per se, consists of seven members of the Cabinet and a civilian chairman, Arthur M. Hill. The Board is not a part of the military establishment under the Secretary of Defense, but is an independent agency which reports directly to the President. Here for the first time in the history of our defense organization is recognition of the fact that mobilization planning in this field is primarily a civilian and not a military concern.

In the eleven months that the Board has been in existence it has developed a pattern for mobilization planning,

based on the experience of the last war, and with consideration of what a possible future war might entail. The principal assumption is that in any future major war we will require a greater utilization, a greater drain on all our resources, industrial, economic and human, than ever experienced before. It is unsafe to base planning on any lesser assumption.

Stated here are the objectives of the National Security Resources Board—the key organization of our entire economy in the event of a future national emergency. Definite minerals policy urged to meet continued high demand. More exploration and research advocated to maintain and expand mineral supply.

Economic Mobilization Outlined

Briefly, the major factors of that pattern of mobilization planning involve an estimate and comparison of the potential requirements for all types of resources, materials, minerals, petroleum, food, industrial plants, transportation, and manpower, and in the event of war, the potential supplies of these resources. How much will probably be needed to wage a successful war? How much will we probably have? Examples and studies of this type have already been undertaken by the Resources Board—petroleum power, natural gas, iron ore. In other words, this factor in mobilization planning might be termed continuous maintenance of a National Security Resources Balance Sheet.

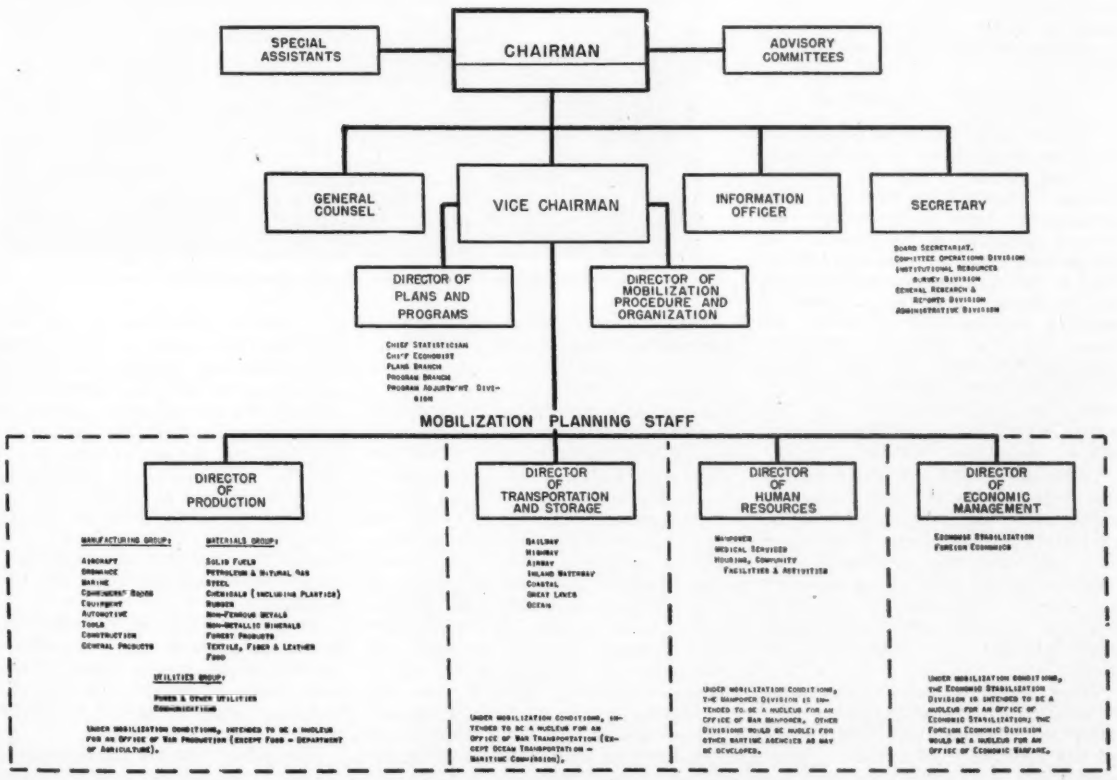
It logically leads to the second phase, which we call "majors of economic readiness." What can be done now to overcome potential shortages? What steps should be initiated now to be prepared for an emergency? In another conflict we probably will not have the time to overcome these shortages after the outbreak of war—stockpiling of strategic materials, an adequate Merchant Marine, maintenance of the synthetic rubber industry developed during the last year, preservation of essential surplus war plants, exploration and development of new resources of minerals. Here is a concept of preparedness in the civilian field which corresponds to the military efforts to maintain an adequate Army, Navy, and Air Force.

A third major consideration in mobilization planning has to do with the organization of Government in time of war. You are all familiar with the multiplicity of agencies of World War II. We are hopeful of developing a simpler and more effective wartime organization, one which will avoid the disastrous confusion and overlapping of the last war.

A full and effective use of resources in the war effort necessitates "majors" of Governmental control over and above those of our peacetime economy.

Governmental procedures are required to direct the flow of metals into essential war production, as the Control of Materials Plan of the last war; to effectively use our limited manpower for essential war purposes; to ration scarce consumer items; control prices; eliminate non-essential production; and to allocate manufacturing capacity. Such procedures should be developed before an emergency arises so that they are available when needed.

There are two principles that guide



Organization of the staff of the National Security Resources Board

the Resources Board on this phase of mobilization planning: (1) that every effort be made to accomplish the required end results through voluntary means, and no control measures shall be applied until absolutely essential, and (2) that such plans be based on the experiences of the last war, to preserve what was effective and to correct the failures.

In this phase of the planning the staff of the Board is assembling and reviewing the many regulations of administrative procedure of World War II. It has prepared a draft of the legislative war powers that would be needed in an emergency.

With the future possibility of airborne weapons, the strategic locations of industrial and other facilities within the continental limits of the United States has become a matter of great concern to our national security. It is a complex and difficult problem, particularly in view of the fact that it is manifestly impossible to make a wholesale relocation for strategic purposes of the industrial plants of this country.

The Board has issued a set of guiding principles for the location of new and replacement plants. Briefly, if you contemplate building any new facility, don't locate it within a five-mile radius of any other essential facility. The most practical protection against bombing, including atomic bombing, is the reduction of the vulnerability of targets through dispersion.

Advance Preparation

Finally, and most importantly, we come to that phase of mobilization planning which might properly be termed "industrial mobilization." This is really the heart of the matter—advanced preparation to produce the things that would be needed in time of war. It involves advance procurement and production planning of items of military supplies and equipment between the Armed Services and the manufacturer. This is a function of the Munitions Board within the military establishment, and constitutes the main dividing line between that Board and the Resources Board.

Industrial Mobilization Planning also comprehends the basic factors of production underlying end-item manufacture, such as power, transportation, fuel, raw, and processed materials. It covers mobilization planning for specific industries so that they will be prepared to properly and effectively undertake their part of the war effort.

Two concrete examples of this phase of Mobilization Planning are the allocation of manufacturing capacities for the production of military equipment by the Munitions Board, and the placing of tentative pool orders with manufacturers of machine tools, which may become effective in the event of an emergency. It is estimated that this latter step will save six months to a year over the experiences of World War II.

Such a comprehensive program cannot be carried out by the Resources Board within itself. It is utilizing other departments and agencies of the Government, advising groups and consultants, and experts from private life and industry itself.

Security Program of International Scope

We have the largest peacetime military budget in our history. Again, we have a peacetime draft, attempting to build up our Army, Navy, and Air Force, following a too-rapid demobilization. We have an intensive atomic-energy program. We are engaged in the largest foreign economic program in world history, although it has, of course, its human aspect. Nevertheless, that program is basically a national-security measure.

From the standpoint of national security, the Government is also concerned with the building of passenger ships and fast tankers for our Merchant Marine, with increased petroleum production, railroad rolling stock, and with the continued production of synthetic rubber and many other critical industries required to strengthen our war potential. Nevertheless, it is a mistake to characterize these current security measures as even a partial mobilization or a general rearmament. Rather, we are attempting merely to strengthen our military power to a point where it is commensurate with our foreign policy and the commitments and risks involved therein.

With the exception of aircraft, the current military procurement program relatively does not loom large. The bulk of the current military budget list, large as it is, is for the support of the Armed Forces we already have, the maintenance of equipment, research and development, garrisons overseas, and occupational expenses, and not for the general wholesale procurement of new weapons and equipment.

Now, what are the implications of Economic Mobilization and Planning and the current security program to the mining industry? It seems to me they fall into three general categories. The first is the current situation. There still exists, three years after the end of the war strain, an actual shortage in many minerals and metals. The needs of our civilian economy, in some cases, is not being fully met. Of course, the security programs add to the demand, but the requirement of military procurement and other problems of a security nature do not loom large and, generally, are a small percentage of the anticipated supply. Even in the case of steel, probably the most critically short item in the civilian economy, the percentages are relatively small, with the exception of a few items such as plates. The steel requirements of the Security Program are generally being satisfactorily met under the voluntary allocation procedures of the Department of Commerce.

It is the policy of the Resources Board to exhaust the possibility of meeting requirements through voluntary methods before recommending any mandatory measures of Governmental control.

The major impact of the current military procurement program will be on aluminum, magnesium, and allied

Mobilization requires vast quantities of petroleum products in steel drums

light metals programs in connection with aircraft.

Recently the Resources Board completed an analysis of the military procurement program to determine whether there was any need for the exercise of the mandatory allocation authority for such programs contained in the new Selective Service Act. The analysis indicated that although there was a strengthening situation, and even though certain materials might develop situations adverse to the success of the program, notably petroleum and steel, there was no necessity at this time for the exercise of the authority granted by Congress. The Board made such a recommendation to the President, which he accepted.

In connection with the European Recovery Program, ships going out of the country under that program do not constitute a substantial or serious weakening of our law of potential, particularly in comparison with the broad security benefits expected from that program..

There is, naturally, considerable concern throughout the mining industry and many other industries about the application of the new draft law. During the last war, miners were drafted by the selective-service system, only to have the Army furnish them to work in the mines. With respect to the administration of the new law, the Resources Board has recently established the principle, not applicable during World War II, of general occupational deferment. Although no positive action has been taken, miners may fall into that principle.

Increased Demand for Minerals

Generally speaking, the current security programs and those to follow will add to the present high demands for metals and minerals, and should have generally the effect of maintaining present high prices and stimulating exploration, research, and development in new technologies and increased production.

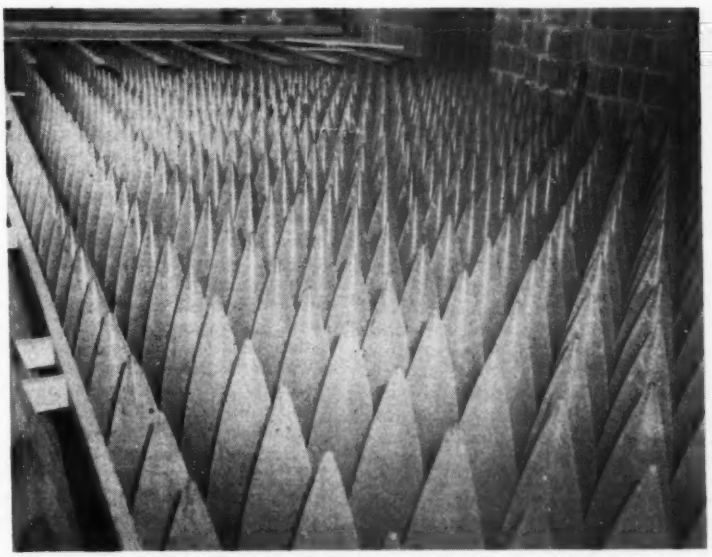
Much of the detailed information in respect to the stockpiling operation is classified as secret because of its value to our potential enemies and the possibility of unfair commercial advantages. By their very definition and selection, strategic metals are generally those which are essential to a war effort, and which are not available in sufficient quantities within the United States.

From the standpoint of national security it would be highly desirable that the United States have all the essential elements for a war effort within itself. It must, however, be recognized that the United States is not a completely self-sufficient nation with respect to minerals. Unfortunately, strategic materials in many cases are also those materials which are in short supply in our civilian economy.

The present status of our stockpile is not satisfactory. The stockpile objectives have been met in only a few items. These objectives are based on an estimate of the military and essential civilian requirements in the war effort. There is considerable lack of balance between the stocks of the various items.

From the standpoint of national security, this is a serious situation. In many aspects stockpiling raises highly controversial issues with respect to the American mining industry. It poses difficult problems to those Government officials responsible for its administration, problems to which there are no clear-cut answers. For example, to what extent, if any, should the limited funds appropriated by Congress be utilized for purchases of high-cost minerals from sources within the United States, particularly in view of the fact that in some cases stockpile objectives can probably not be met within any reasonable period of time by such methods? On the other hand, to what extent should Government funds be used to keep alive

(*Continued on page* 96)



Tungsten-carbide tips are the essential ingredient of armor piercing shells

Used food containers must be detinned to salvage a vital metal

The Role of Research in the Development of Labor-Saving Equipment and Methods

By E. R. BORCHERDT
Chief Research Engineer
Anaconda Copper Mining Co.

CONCERNED as it is with the exploitation of exhaustible resources, the mining industry must meet the challenge of decreasing ore grades and increasingly difficult extraction conditions by devising more highly-developed, labor-saving devices and methods. The non-selective, mass-mining operations, through continued improvements in mechanization, have made great strides in attaining high output in terms of tons per man shift. Some open-pit copper operations are exceeding 100 tons per man shift while block caving methods are yielding more than 30 tons per man shift. However, in most underground metal mines, where the selective mining of comparatively narrow ore occurrences preclude the use of equipment and methods adapted to bulk mining operations, the problem of increased output per man is a much more difficult one.

Many years ago the Anaconda Copper Mining Co., recognizing the advantages to be gained by coordinating efforts to improve output through improvement of existing methods and equipment, established a mining research department.

The principle of research as applied to industry is a relatively simple thing. Most people think of a research department as an aggregation of test tubes, microscopes and things of that kind, but in reality research is not necessarily scientific in the accepted sense at all. In fact most of us, whether we are aware of it or not, practice many principles of research every day of our lives. A definition of research was once expressed by "Boss" Kettering in simplest form as "an effort to find an easier or cheaper way to do something." In one form it may be exemplified by a man at a desk, busy getting from the world's journals those ideas which he believes to have a bearing upon the particular industry with which he is associated. This type of research is generally followed in the mining industry.

Another way to institute research is to have a man whose job it is to travel, to visit, and study the operations of other companies, to search for ideas and to keep informed of new developments in the industry. Those ideas that appear to have application to the operations of his own company are presented to the management for consideration. This type of research is especially valuable and it is now being utilized by many of the larger domestic mining companies and, perhaps to a greater degree, by several foreign companies. They recognize that it is worth while to take advantage of existing knowledge of methods and processes rather than starting in from the beginning, duplicating the research of others.

Inspection of outside properties serves not only as a means of obtaining information, but is of great importance in that it stimulates thinking and reasoning. Everyday routine and methods are viewed in a new light. On many occasions ideas that appear at the time to have no useful application are unconsciously catalogued in the mind and later make their appearance when occasion for their use arises.

A most useful form of research adopted by a few of the larger mining companies is the ofttimes elaborate time-study method in which each operation is broken down into components so that inefficiencies become more readily apparent. It is virtually impossible for a boss or other supervisor to analyze a job in the course of the usual one or two short visits to a working place during the shift. Detailed time studies are required. Such studies may suggest an entirely novel method of accomplishment. All research is fundamentally tied to observation and analysis.

The coal industry's use of the term "mechanization" to cover the application of mechanical means to effect savings in labor does not strictly cover the field of labor-saving practices developed in the metal mining industry without the application of mechanical means. This might better be covered by the term "mining research," a field closely allied with mechanization but

Jumbos increase rate of advance in drifting

broader in that it deals with improvement of methods not necessarily involving mechanical means.

Results of Research Must Be Sold

Selling the idea of progress is the most difficult part of a research engineer's job. Too frequently, when a new idea is presented, the instinctive reaction is to oppose it. We are creatures of habit, and this habit of doing a thing in a certain way results in our minds—perhaps unconsciously—accepting the accustomed way as the best way. The longer this custom continues, the more difficult it is to overcome. It becomes the path of least resistance and we find it much easier to condemn a newly-proposed idea as being impracticable than to put forth the effort to find out how the idea could be made workable. The miner's prejudice toward anything new, whether it be an improved drill round, a new type of explosive, a new type of loader or a detachable drill bit is well known. Frequently these prejudices impede development and make it difficult to evaluate properly the benefits from the improvement.

In fairness to the miner it should also be stated that once his initial prejudice is overcome and he is sold on the advantages of the new equipment he becomes equally voluble in its praise. Definite opposition to the Hawkesworth detachable bit in 1923 is recalled in spite of the fact that its use resulted in a substantial reduction in the physical effort required to handle conventional drill steel. Again in 1931, when we tested the first Finlay loader ever built, there was definite opposition to its use for a long time. However, it would have been difficult to remove either of these types of equipment from service after the first year, without strong protest from the very men who had earlier condemned them.

The research engineer's task of selling new ideas is not confined to his efforts with the miners. Management also may be slow at times to accept changes. Without a sympathetic, progressive management no amount of research and investigation will bring forth improvements, and without active interest on the part of the management in the follow-up and application, the best of ideas can be expected to fail.

It is interesting to observe that at the commencement of periods of increasing wages it is frequently possible to keep ton costs constant for a time, but with continued wage increases the ton costs for labor increase because labor-saving devices do not increase output per man sufficiently to offset increasing wage rates. Possibly this holding of the line for a time results from improvements in practice developed during the period preceding the start of wage increases, improvements not applied to full advantage until the pressure of increasing costs required it.

There are many cases where improved equipment is adopted that results in questionable tangible benefits for the company, but which makes the miner's work easier. Other things being equal, most mine managers will concede that if a man's work is made easier to accomplish, he will, under proper supervision, either do more work or better work. We certainly cannot expect to increase output by getting men to work harder while the present competition for labor's services exists. On the contrary, the best possible working conditions must be provided in order to attract good workmen to the job.

In the highly-mechanized automobile factories it is not unusual for one man to operate more than one machine; multiple operation makes it possible to realize the full capabilities and economy of modern machinery. On the other hand, in the mining industry there is definite resistance to one-man drift drilling in many districts. This idea perhaps is fostered by some who reason fallaciously that labor-saving equipment is a threat to the security and continued employment of the laboring man.

Through observation and study of existing methods, researchers with open minds can find easier and cheaper ways of doing the job of mining. One of the foremost men in this field explains here the scope of mining research and some of the results obtained in the field of rock drilling, including bits, drill steel, rock drills, drill rounds, and high-speed drifting. The details of other achievements of mining research will appear in a subsequent issue.

Research at Anaconda

The present research department had its beginning in Butte many years ago when experimental investigation of rock drills and detachable bits was inaugurated. From this modest beginning the activities of the department were gradually extended to include investigations of every form of equipment and underground method, not only in the Butte mines but in all the various mining operations under the control of the Anaconda Copper Mining Co. in various parts of the world.

Because of physical conditions affecting maintenance in the Butte mines it has been found that equipment which stands up there can be expected to stand up at almost any other operation. This condition has resulted in a major part of our research work being done in the Butte mines. Where exceptional conditions are encountered at some other property, the research work is carried out at that property.

In general, three types of research are practiced:

(1) Research involving increases in mine efficiency through improving older practices or devising new ones to increase stope production per man shift, drift advance per man shift, etc.

(2) Research involving increases in efficiency through improvements in equipment. Such improvements fall into two principal classifications—those which result in direct increases in productive work through increased speed or capacity of machines, and those in which mechanical improvements reduce the maintenance time, permitting increased utilization of the equipment. These last are achieved generally as the result of keeping a careful set of records of failures, repairs, and performance of parts, so that corrections can be instituted.

(3) Standardization studies, relating both to methods and equipment. Standardization is an important factor in cost reduction and underground efficiency. Lack of standardization is most apt to be met where operations have grown through consolidation of smaller units, and personal opinions and prejudices remain. Large savings have been achieved in such cases by adopting uniform practices.

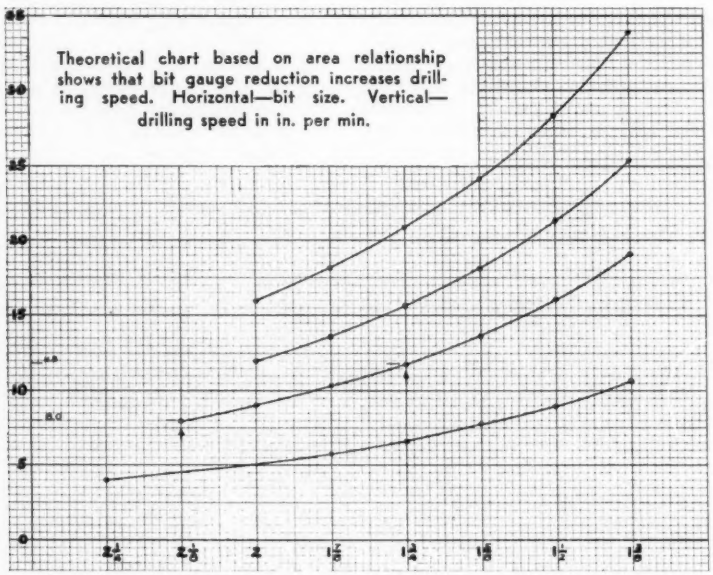
Current Developments Aim at Increased Efficiency

Important progress has been made during recent years in breaking ground in underground mines. Drilling and blasting probably receive more study than any other phase of underground metal mining, justifiably so because of their importance in the cost of mining.

It has long been realized that the use of small drill bits would result in increasing the drilling speed and re-

ducing the time required to drill a round. Canadian mines have taken advantage of these and the other benefits of bit size reduction more generally than have domestic mines, but the trend in this country today is towards small bits, light drill steel, and light machines. All of these are labor-saving devices.

The accompanying graph shows the relationship between the cost of drilling and the size of the bit, viz., how increasing the size of the bit increases the cost of drilling the hole. This demonstrates the fallacy of the idea that it is economical to use large bits in order to get additional resharpenings or useages. At the Carlton Tunnel, reduction in size of drill bits was


Theoretical chart based on area relationship shows that bit gauge reduction increases drilling speed. Horizontal—bit size. Vertical—drilling speed in in. per min.

acknowledged to have played an important role in making possible record advances.

Drilling small holes introduces a new factor into the blasting problem. Frequently it is possible to accomplish the breaking job with the same number of holes, but in some ground it becomes necessary to increase the strength of the explosives in order to produce equivalent fragmentation. Further research in applying smaller stick diameters and higher strength dynamites would seem desirable. For convincing proof of the practicability of small hole blasting, one need only look to the many cases of diamond-drill, blast-hole breaking with $1\frac{3}{16}$-in. holes in hard ground, with several times the burden used in drifting.

The Anaconda company has pioneered in the field of detachable drill bits and by 1923 had its first mine completely equipped with Hawkesworth bits. Later, the drilling in all Butte mines was successfully done with this type of bit, involving the use of 250,000 bits per month. This required extensive research both in underground studies and in manufacturing methods—research which it has been necessary to continue to this day.

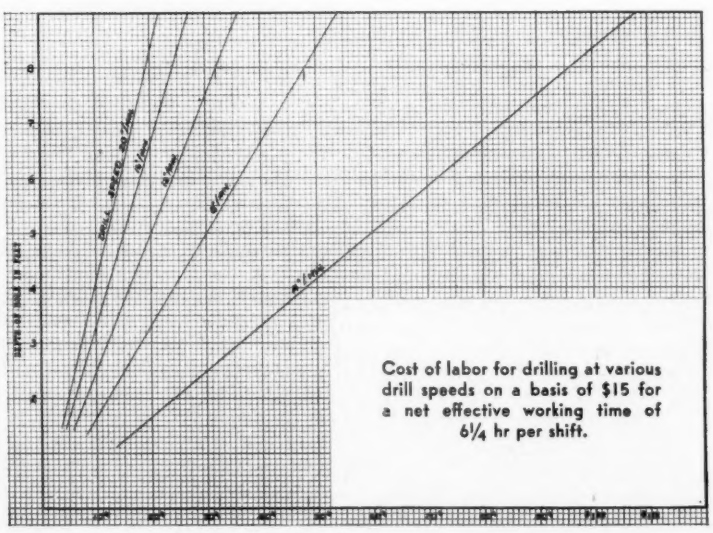
As the use of detachable bits became general in the mining and contracting industries, many new types of bits were brought out, requiring constant investigation. When it was found that a threaded bit had definite advantages over the Hawkesworth bit the latter was abandoned and existing manufacturing facilities were converted to the fabrication of the threaded bit. Again, during the past year, when advantages accruing from the drilling of smaller holes with the Liddicoat bit were studied, this bit was adopted in most of our properties. We originally encountered difficulty in removing the bit from the rod but this was overcome and the installations are working smoothly and efficiently.

All of the "one-pass" or "throw-away" types of bits originated in the British Empire. These "one-pass" bits are generally not resharpenable and therefore can be designed to give greater life and higher drilling speed than a bit which is sharpened by grinding or hot milling. Its use also eliminates the need for extensive bit reconditioning equipment.

Rather extensive use of alloy-steel rods in Canadian mines has demonstrated a substantial reduction in rod breakage. Alloys also contribute greater stiffness or rigidity to rods. For instance, when using $\frac{7}{8}$-in. quarter-octagon steel, noticeably higher drilling speeds can be obtained with alloy rods in the long lengths than with carbon steel of the same length and with the same size bits. American manufacturers are now supplying alloy drill steel.

Use of $\frac{7}{8}$-in., quarter-octagon steel makes stoper drilling easier and faster, for it is possible to raise the long fourth and fifth rods to the bottom of the holes with one hand while holding the drilling machine in the other. Where 1-in. steel is used, the increased weight of the steel makes it necessary to lay down the stoper and use both hands to place the fourth and fifth rods in the holes.

In stoper drilling the use of smaller bits and smaller, lighter drills has made it possible to drill an equivalent number of holes in the same time as with the heavy stoper and large bits. It is felt that even lighter stoper drills



are desirable and possible if lighter alloys are used.

The use of long feeds combined with small, long-lived drill bits has made it possible to lengthen the interval between changes in drifter drill steel, thus reducing the number of times that steel must be changed during drilling. It should be possible to achieve a similar gain in efficiency by applying the same principle to stoper drilling. To this end one manufacturer is expected to soon make available a new type of long-feed stoper.

In secondary breaking in open pits where use of bits in sizes down to 1¼ in. is practicable, 30-lb to 35-lb plugger machines are being used. Smaller section drill steel rods of perhaps ⅞ in. or ¾ in. diam will no doubt be used for this work ultimately.

Extensive research studies have been made during the past two years by the International Nickel Co. in breaking drift rounds with burn cuts. A round has been developed in which the burn holes break to a large reamed center hole. The ground is very hard, yet powder consumption is low. Drilling is done with Craig detachable bits, starting with 1⅝-in. gauge and finishing with 1⅜-in., using 2-ft changes of steel and 1/16-in. gauge changes. The center hole of the burn is then reamed with a 2¾-in. Timken bit. The novel feature of this burn cut is that, instead of spacing the four outer holes of the burn equidistant from the center hole, the first hole is drilled 2 in. from the center hole, the second 4 in., the third 6 in., and the fourth 8 in. from the center hole. These holes are then shot in 1, 2, 3, 4 sequence using caps and fuse with a 3-in. trim for proper time interval. In softer ground the spacing interval could be 3, 6, 9, and 12 in., or even greater. Rounds 10 to 12 ft deep are pulled readily by this method.

The photographs show two experimental cuts with the above spacing, drilled in hard, normal Butte granite. The first burn hole was loaded with one 8-in. stick of No. 2 Gelex and one 8-in. wood spacer, followed by alternate sticks of powder and spacers to the collar of the hole; the powder was not tamped, but only pushed firmly into place. The second, third, and fourth holes were loaded similarly, alternating two sticks of powder with one wood spacer. The center hole in each of these rounds was reamed with a special 3⅛-in. reamer bit and rod, of the type shown in the accompanying photograph. Note that the end of the rod extends about an inch beyond the cutting edges of the bit. This extension serves as a guide or pilot, following the small hole previously drilled. The combination of six-pointed rose bit and guide is a much more efficient reaming tool than a large conventional cross bit without the guide.

Further work with hydraulic drill jibs has demonstrated that high rates of advance can be attained. A team of four miners, two men on each of two shifts, working in two 8 by 10-ft headings, have made 112 ft of advance in a six-day week. One miner on each shift drills out a round in a heading while his partner mucks out the other heading. This large amount of drilling by one man, operating two machines, is made possible by using long feeds and reducing the number of steel changes to two—a 6-ft starter and a 12-ft finisher. The method, of course, can be applied only in ground where a bit will drill efficiently for 6 ft or more. By drilling one hole 4 or 5 ft in advance of the other and thus staggering the sequence of operations, it is possible for one man to keep both machines running continuously, in addition to changing drill bits.

The jib eliminates the usual heavy physical exercise entailed in positioning heavy drills, and the elimination of dumping and swinging drills to make steel changes increases the effective drilling time.

Power feed drills with 4- and 5-ft changes are now available and several mechanically-actuated jibs are in the development stage.

It is felt that some practices used in high-speed contract tunnel driving can be adapted profitably to underground drifting and crosscutting. Where operations are limited to one heading, advance could perhaps be increased greatly by use of a continuous drilling-blasting-mucking cycle made possible by reversible fans exhausting powder smoke and gas to return air courses.

Mucking is being speeded by using car changers to afford better car service to loading machines.

Supervision is required in order to take full advantage of high-speed drilling, an advantage which is frequently lost because of the tendency of miners to drill more holes than are necessary.

(*Concluded in December*)

Unusual combination bit reams blank hole for burn cut

Unequal spacing of burn holes gives low powder consumption and enables pulling 10 to 12-ft rounds.

Experiences With Control of Gob Pile Fires

The Increasing Burden Being Put on Coal Preparation Plants Results in Greater Quantities of Rejects, with the Accompanying Problem of Storing Them in Such a Way as to Prevent Gob Fires from Starting

By HENRY F. HEBLEY
Pittsburgh Consolidation Coal Company

DURING the last decade there has been a resurgence in popular demand for a reduction in the amount of smoke released in the atmosphere. The greater problem of atmospheric pollution is slowly being appreciated by a few of the thoughtful citizens; but for the most part the enthusiasts are content to strive toward the elimination of visible smoke. The cost, the economic soundness of the plan, carries but little weight, and it behooves industry in general to give serious thought to the methods it plans to adopt for curbing the atmospheric pollution that arises from industrial activities. Amongst the most difficult of the problems associated with industry, especially the coal industry, is the elimination of the smoke and fumes from gob piles associated with the production of coal.

Outline of the Problem

This problem of gob piles may be conveniently divided into two phases:

(1) Methods for quenching gob pile fires that are active

(2) Methods of gob pile disposal that will prevent spontaneous combustion and ignition of piles.

In regard to the former, it may be said that no method adopted has been universally successful. Answers have been received from inquiries sent to over 20 coal-producing companies in the USA but the replies have not furnished much encouragement. Many of the answers quite frankly stated that some of the attempts resulted in failure, even to the extent of encouraging the fire.

Correspondence has been carried on with coal producers in Great Britain to learn of the methods adopted in that country to quench the fires that were acting as beacons for enemy air attacks during World War II. This information is being prepared at the present time and should be available to the coal industry in the near future. In the meantime, the following factors may be given some thought:

Coal experiences its greatest rate of oxidation immediately after it is mined, and such oxidation creates heat. The oxidation takes place on

the surface of the coal. Therefore, the finer the particles, the greater the surface to mass ratio, the greater the opportunity for rapid oxidation. With intergrown layers of coal and dirt (bone, boney middling, shale, etc.), the carbonaceous matter heats and causes the shale to expand and crack, thus exposing fresh coal surfaces for rapid oxidation.

The question of pyrites (iron sulphide) stimulating gob fires is still being debated. The prevailing opinion holds that the sulphur does heat, especially if it exists as lenses or concretions of rather pure iron sulphide (nigger heads, brasses, etc.) If the sulphur is present as small isolated specks distributed in the coal matter, it may not have much influence. Where the sulphur is present as marcasite, it may become quite active in the pile.

In consideration of the influence of iron pyrites (FeS_2) it probably oxidizes to ferrous sulphate ($FeSO_4 7H_2O$). Such an action is exothermic and requires water for the reaction. However gob piles, especially those containing washery waste, have an ample source of moisture.

An indication that subterranean burning of the combustible in the pile in association with carbonaceous matter and ferrous sulphate has progressed is shown in the presence of strong concentrations of sulphur dioxide in the atmosphere in the vicinity of piles and to the leeward of them. Probably the heating of the ferrous sulphate first drives off the water of crystallization associated with the ferrous sulphate and secondly decomposes the compound. $2FeSO_4 = Fe_2O_3 + SO_2 + SO_3$.

However, deposits of free sulphur are often observed on the surfaces of gob piles especially around the fumaroles that develop on such piles. It is felt that possibly such deposits are brought about by the roasting of the iron pyrites. The deposits may be caused by the burning of sulphuretted hydrogen (H_2S) with an insufficient supply of air. In any event, the free sulphur, if it burns, will be oxidized to SO_2 and water. $2H_2S + 3O_2 = 2H_2O + 2SO_2$.

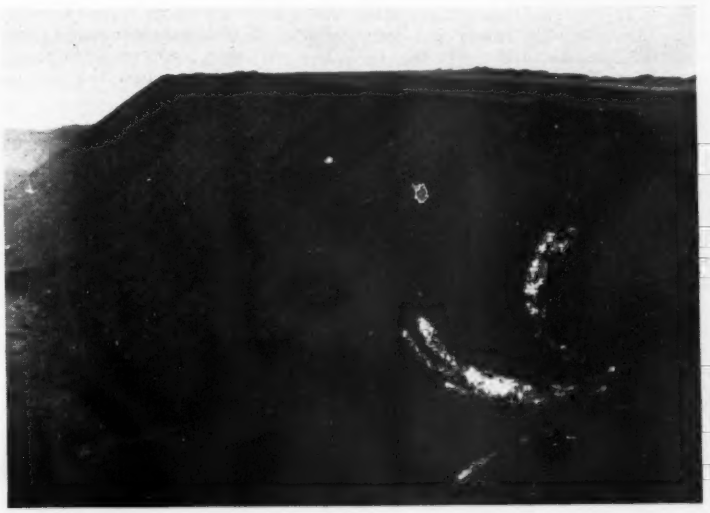
During any nocturnal inspection of many of the burning gob piles in central and western Pennsylvania, the characteristic blue flame of burning sulphur and the unmistakable odor of sulphurous gases indicate the reaction. It should be borne in mind that sulphur dioxide (SO_2) is soluble in water and forms sulphurous acid. $SO_2 + H_2O = H_2SO_3$. Then such sulphurous acid is easily oxidized to sulphuric acid. $2H_2SO_3 + O_2 = 2H_2SO_4$.

The presence of this acid is a nuisance wherever it is encountered in the coal-mining industry. It is highly corrosive, it is the dominant source of stream pollution in the coal-mining areas situated within the Ohio River drainage area and adds greatly to the prevalence, persistence, and acrid conditions of fogs encountered in industrial areas.

The manner in which the refuse is dumped on the pile has considerable influence on burning. Refuse, if discharged over the face of the pile, will take a rather steep angle of repose and there will be size segregation of the coal and refuse particles. Under such conditions, there will be a variation in the amount of ventilation within the pile. On the surface, with large particles at the foot of the pile, the voids and the free circulation of air may be able to dissipate the heating effect. Deep in the pile it may be so compacted that no air for oxidation can penetrate. Somewhere between these two extremes, there is a zone of oxidation and heat with insufficient ventilation to cool the area. As the temperature increases, the rate of oxidation is accelerated until ignition takes place and combustion becomes self-sustaining.

In hilly terrain, where the refuse has been discharged over the hillside, the effect of valley breezes stimulates combustion. In the afternoon, on sunny days, the air current will start from the bottom of the valley and sweep up the hillside creating a strong draft up the face of the pile and a chimney effect through the interstices of the pile will be experienced. In the evening, the cool air will tend to sink to the bottom of the

A gob fire as shown above could not occur in the well-packed refuse dump shown below



valley, but will be hindered by the heating of the air close to the burning areas. Thus, the fumes will stay in a stagnant layer until the next day.

It has been observed that the rise and fall of atmospheric (barometric) pressure causes a breathing of the pile and encourages burning.

Wood, oily waste, pit props, brattice cloth, etc., if dumped on the pile with the refuse, may furnish incipient spots for combustion. Similarly, steam pipes have been known to start a blaze —even though the pipes were buried. It has been noted that a pile, even though it had been dormant for years, will catch fire if a fresh quantity of refuse is placed on its surface.

Methods Adopted to Quench Gob Pile Fires

When water is used for quenching gob pile fires, widely varying results are produced. On many piles, where a hose or pipe line has been carried to the top and the water allowed to run down the pile, it has been found that although the flowing water may retard the fire, the pile will burn with renewed vigor as the supply of water ceases. The water seems to wash away the fines, leaving fresh coal surfaces and a channel through the pile for the easy admission of air. In addition, the water flowing down the pile, cuts channels in the surface thus increasing the exposed area.

The injection of water alone into the interior of piles is fraught with some difficulties. Wherever active combustion is encountered, the existence of internal cavities must be accepted. The danger to workers from the collapse of the surface shell or from fumes is well known to all having experience with gob piles.

Water, if changed into steam, although extracting some of the heat of the pile to meet the demands of latent heat, carries the heat of the steam as it migrates through the pile. On recondensing, it raises the temperature of areas in the pile far removed from the actual seat of the fire. Such an action may initiate self-heating at an accelerated pace.

If the water is poured into the pile in such volume that hot water is discharged from the base of the pile, upon stopping the water supply, the channels so formed furnish flues or ducts for the admission of air into the center of the pile.

Some experiments have been carried on using "placer" methods of mining with water at 300 psi directed through mining nozzles to wash the pile down. The cooled material was then loaded into trucks and dumped in small piles uniformly over a new area. Such circumstances presupposes level ground and an ample supply of water. These conditions are not available in restricted areas of hills and valleys.

In Ayrshire, Scotland, in order to smother the glow of the fires, water in a fine spray or fog was successful, but there was a tendency for the pile to blaze up soon after the water was cut off. If the sprays were discontinued for one day, it would take approximately one week to regain all the headway that had been previously gained.

Varied success has been experienced through the use of clay and earth covering the foot of the pile where the coarse material is situated. Puddled clay has been used and allowed to seep into the pile. In some instances, this method was successful for a time and then cracks appeared in the covering permitting air to enter and causing a recurrence of the blaze.

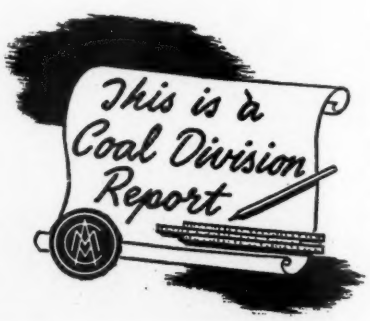
The thickness of the clay layers varied between wide limits, say from 8 in. to 5 ft or more. Slag and fly ash from boilers has been used, but these were found to be too porous and granular to effectively keep out the air.

Trenches have been dug to isolate a fire in the pile and then the trenches were filled with lime and soda mud from a large water softening plant.

A modification of the use of lime consisted of pumping a slurry of finely powdered limestone and water through a series of sprays. The water carried the limestone into the pile and after the water had evaporated, the lime was burned to slack lime but stayed in the pile and seemed to act as a mortar binding the particles together.

One method used in quenching a rather large gob fire consisted of a modified "cementation" process. A 50/50 limestone and water slurry was forced into the pile through 3-in. pipes pointed at the end and equipped with ⅜-in. holes at the bottom to permit the distribution of the slurry. The fire was attacked from both ends. Rows of pipes were driven into the pile on even centers and then the grout was forced into the pipes and through the interior of the pile with the use of compressed air. The amount of mixture taken by individual pipes varied within wide limits, dependent on the extent of the voids within the pile.

There are variations of these methods that have not met with success, but sufficient has been said to indicate the method of attack. Layouts, quantities, and equipment will be prepared at a later date.



Prevention of Gob Pile Fires

Briefly, the principles used consist of crushing the refuse, depositing it in layers to prevent segregation, spreading the refuse out and then compacting it with bulldozers and trucks travelling on the pile.

In hilly country, it has been the practice to cut a shoulder into the hill and spread the excavated earth over the fresh surface of the gob pile. Care has been taken in some cases to keep the center of the top surface a little below grade in order to have a basin to collect rain when it falls. The question of maximum size of particle of the crushed material is not known. It should be the subject of some experimentation.

Where the gob is deposited in a valley, studies should be made of the amount of "run off" from the watershed above the pile as a flash flood or a sustained rainfall may create hazardous conditions below the pile —especially if dwellings, railroads or structures are located in the valley.

An additional point that needs consideration is the condition of the drainage through the pile. With the stream pollution problem laws placing restrictions on the drainage entering the stream system, care must be taken to insure the water being acceptable.

Comprehensive Committee Study Recommended

The foregoing notes have been prepared to draw the attention of the coal-mining industry to an ever-increasing problem that confronts the operators. With the trend toward full-seam mining followed by mechanical cleaning and washery, the refuse handled per day is reaching huge proportions. Little systematic data dealing with gob piles are available to the industry. Worded somewhat brusquely, the industry knows practically nothing regarding methods developed either for quenching active piles or for depositing refuse in a manner that will prevent spontaneous combustion. It is thought that a committee appointed to collect information on the experiences of the coal industry and present it through the American Mining Congress to the industry would serve a useful purpose.

Photogeology—A Tool for Mineral Development*

Interpretation of geology from aerial photographs aids greatly in exploration and development of mineral resources. The technique has particular value in the development of strip coal mines.

By ROBERT C. STEPHENSON
and
RICHARD M. FOOSE

Respectively, Assistant State Geologist, Pennsylvania Geological Survey, and Head, Department of Geology, Franklin and Marshall College

NEW possibilities in the field of finding minerals have been opened by the combination of field geology and aerial photographs. The geologist using photogeologic techniques is able to make more accurate geologic maps with a considerable saving of time and money. Photogeology was pioneered by the petroleum geologist and is widely used in the never-ending search for new sources of oil and gas. The application of these methods to prospecting for other mineral resources is, however, being increasingly recognized. Interpretation of geology on aerial photographs has proven particularly valuable in prospecting for coal, clay, and other bedded or sedimentary deposits, especially those to be mined by open pit methods.

Economy of Photogeology

Photogeology offers singular advantages. It combines more accurate results with a marked economy of time and money. It has been estimated that an experienced geologist utilizing aerial photographs to the maximum advantage may map a given area 25 per cent more accurately than by usual field methods, *and* with a saving of one-third or more in time and cost. Obviously, the competence of the geologist, both in the field of geology and in photo interpretation, will greatly affect the quality and ultimate value of the work. The development of interpretive technique is a personal factor which grows with experience.

One cannot hope to dispense with field geology when employing photogeologic methods. A certain amount of preliminary geologic field work is necessary to provide basic control for the interpretation of geology observed in photo examination. Throughout the study of the aerial photographs, the geologist must go periodically into the field to check critical and abnormal areas revealed by the photogeologic investigation. This technique minimizes lost motion on the part of the geologist by eliminating much time-consuming leg work which is usually essential in good field mapping practice. The great gain in efficiency of field work is responsible to a large extent for the saving in time and money.

Photogeologic mapping has been acknowledged to be especially valuable in rough, deeply-dissected country that is often inaccessible. In such country, when forest cover is heavy, usual geologic field methods are severely hampered. Photogeology has proven its worth as an accurate, economical means of prospecting and development in areas of such terrain.

Operators prospecting for and developing mineral resources should not fail to recognize the economy of retaining a geologic consultant to guide these activities. Insufficient knowledge of geology often results in costly blunders in mine development, sometimes even failure. Inefficiencies in prospecting are not uncommon among strip coal operators. Because they own an idle bulldozer or diamond drill, they fail to recognize the poor economy of engaging this equipment in haphazard, often aimless, prospecting. They do not realize that the operating costs of this equipment, much of which may represent wasted money, could actually be channeled into effective prospecting. The geologist, utilizing photo techniques, is able better than ever before to direct such exploratory work.

In addition to guiding the prospecting and development of one particular mineral commodity, the experienced photogeologist is alert to the possibilities of other potential mineral resources that may be lying undeveloped in the area under consideration. The ultimate economic return from any given tract can be realized only when all of its resources are developed to the maximum extent.

Dr. Foose

The authors of this article have had extensive experience in the application of modern geological tools. Dr. Stephenson has worked at the MacIntyre Development of National Lead Co., in a survey of uranium-vanadium deposits of the Colorado Plateau, and in petroleum exploration in the Rocky Mountains, prior to joining the Pennsylvania Geological Survey.

Dr. Stephenson

Dr. Foose, after teaching at Northwestern University, became senior geologist for the Pennsylvania Geological Survey, and since 1946 has been in his present position at Franklin and Marshall College, in addition to undertaking varied geological consulting work.

* Published by permission of the Director of the Pennsylvania Geological Survey.

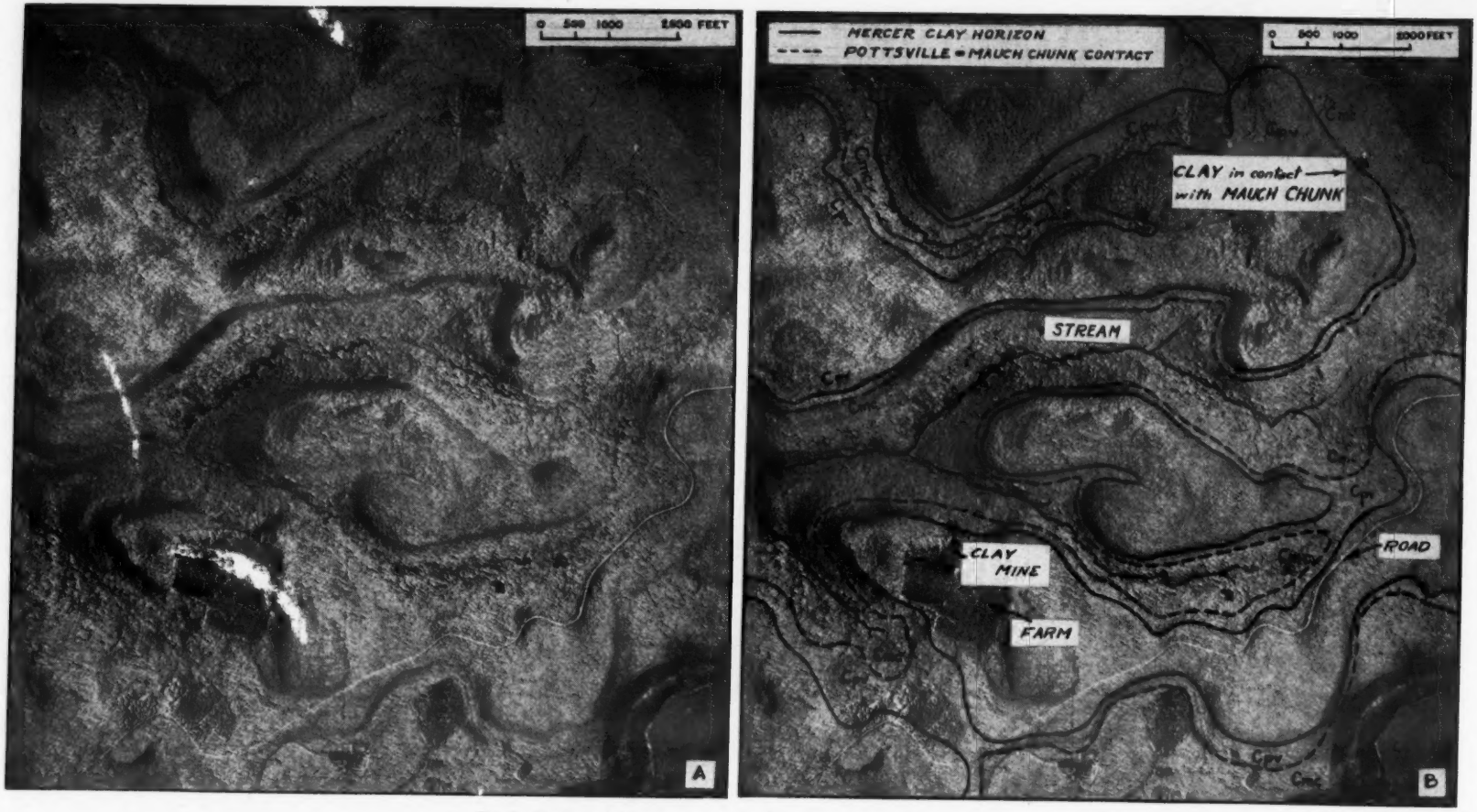


Fig. I—Geologic interpretation of air photo in clay-producing area

A. Air photograph prior to geologic interpretation

KEY TO GEOLOGY

ALLEGHENY FM. shales, sandstones & coals

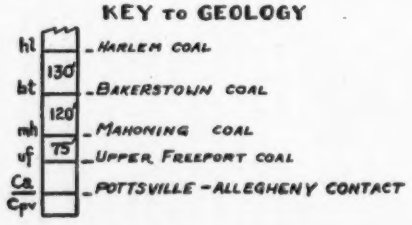
Cpv { 0-40 HOMEWOOD SANDSTONE; 0-10 MERCER CLAY; 0-60 CONNOQUENESSING SANDSTONE } POTTSVILLE FM.

Cmc { 20+ MAUCH CHUNK FM. red & green shale

B. Same photograph as A, but with geology outlined. Traced on this photograph are the crop lines of the Mercer clay horizon and the contact of the Pottsville beds with the distinctive underlying Mauch Chunk red and green shales. Note the absence of the Connoquenessing sandstone in the upper right-hand corner where the Mauch Chunk shale is shown in contact with the Mercer clay. Not specifically designated on the above photo are coal mines in the Allegheny formation above the Mercer horizon

Fig. 2—Geologic interpretation of air photo in coal-producing area

A. Air photograph prior to geologic interpretation



B. Same photograph as A, but with geology outlined. The crop lines of four coals—Harlem, Bakerstown, Mahoning and Upper Freeport—have been traced on this photograph, as well as the contact of the Allegheny-Pottsville formations. Note heavy sandstone overlying Bakerstown in upper left hand corner. The trend of a synclinal structural axis as determined by photogeologic study is shown crossing the photograph

Application of Air Photos

In most cases, the aerial photographs used in photogeologic mapping are available from commercial companies specializing in aerial photography or various governmental agencies. The scale of the photographs varies considerably depending upon the use for which they were originally intended. If suitable photographs are not already available, they can be provided at a reasonable cost by commercial aerial survey companies. These companies can also use these photographs to produce excellent topographic maps of small contour interval that will greatly facilitate the engineering aspects of the development. The photographs are taken with sufficient overlap to permit stereoscopic study of detailed land features. The photogeologist in his studies may use a number of instruments which have been developed to aid in the interpretation of aerial photographs.

Economic deposits, geologic horizons, geologic structure and other phenomena observed in the photo study may be recorded directly upon the photographs, that in reality form a preliminary geologic map. The data from all of the photographs used on a project may then be combined to produce the finished map. An aerial mosaic, prepared by matching individual photographs, may be used to great advantage as a base for geologic compilations, if available.

Coal and Clay Crop Lines Indicated

Though photographs may aid in the mapping of many varied mineral resources, the authors have chosen to confine their comments to photogeologic techniques as applied to development of coal and clay deposits, because they illustrate well the versatility of the methods.

Good air photos commonly reveal significant features of vegetation, topography, soil and rock outcrops that may pass unnoticed by the geologist working in the field without their aid. Once these features have been observed on the photos, they may be made the focus of intensive field study. On foot, in rugged wooded country, it is often impossible to follow the crop line of stratigraphic horizons. Aerial photographs are invaluable in tracing coal, clay and other geologic horizons as well as structural features in areas of such terrain. Bedrock features expressed in topography stand out clearly and in considerable detail on aerial photographs. This topographic expression of geology is often accentuated by variations in soil and vegetation also recorded on the photographs. Even on the best topographic maps much of this clarity and detail is lost. The topographic expression of coal and clay benches, for example, is often too insignificant to be recorded on a 20-ft contour interval topographic map. These same benches, however, can usually be traced with great accuracy by the photogeologist.

With a minimum of accurate preliminary geologic control and general back-ground of geology in any given area, the photogeologist may proceed with the study. Probably one of the greatest single advantages of this type of mapping is that crop lines of coal and clay beds may be traced with great accuracy. These crop lines can be permanently recorded on the photographs and can be used as a field guide to prospecting and development of the beds. This method is obviously of great advantage to the operator interested in open-pit mining, for much aimless prospecting may be averted.

Aerial photographs have been chosen to illustrate specific areas where photogeologic methods were employed to trace out clay and coal horizons (Figs. 1 and 2). Significant geologic and cultural features are delineated on these photographs. Both of the illustrated areas lie in rugged, inaccessible, heavily-wooded country where usual field mapping is an arduous task. The field work necessary in the mapping of these areas was reduced, however, to a well-planned check of certain critical areas revealed through photo study.

When key beds have been traced by the photogeologist, he is then able to interpret the geologic structure that influences the attitude of the beds. Faults, as well as folds, may be detected and mapped. The correct interpretation of these structural features is especially important in deeply dissected areas where folding and faulting frequently result in errors in the correlation of beds.

Many coal mine operators have had bitter experience with depositional or stratigraphic anomalies that have resulted in a disturbance of the bed they are mining. Coals and clays may be absent through nondeposition, or they may have been removed by stream-channelling shortly after deposition and replaced by sandstone or shale. Such breaks in the continuity of coal and clay horizons are frequently detected by photo study. (See Fig. 1). Recognition of such phenomena in advanced geologic studies of areas under development can obviate costly nonproductive preliminary work.

Accurate Exploratory Control

In a preliminary investigation of the potentialities of any given area with respect to strip mining, photogeologic guidance is invaluable. The geologist can contribute accurate and valuable data on the area distribution of the beds to be developed and the approximate amount and general character of the overburden that must be removed in mining. He can in most cases properly correlate and name the various coal and clay beds, a feature often highly desirable, but frequently impossible to do by usual field methods. In one instance, proper correlation led to the realization that another high-quality coal bed lay underneath a coal that was being stripped. The geologist can intelligently guide initial mining plans by his knowledge of the structure of the beds. This feature has special value in coping with problems of drainage and haulage.

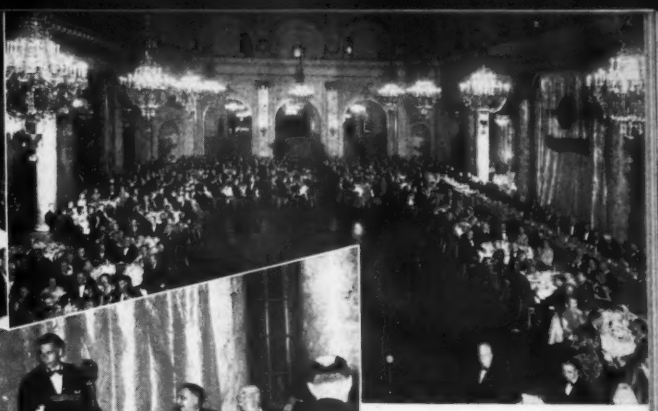
As pointed out earlier, photogeology is correctly employed as an intermediate step to increase the accuracy of final results and minimize the time and cost of geologic studies. During the photo study by the geologist, a field examination should be made of critical areas indicated on the photos to assure correct geologic interpretation. Whereas certain basic facts hold true for any area, each area is a problem in itself, and local anomalies must be interpreted in the light of all the geologic processes that have "operated" on that area. Hence, the greatest accuracy in mapping any specific area may be expected only when a complete correlation of the photogeologic data and critically selected field studies has been made. In every case this combined study requires less time than a thorough field investigation by usual methods and is far more accurate.

Efficient Guide to Test Drilling

The services of the geologist, who has a comprehensive picture of the geologic phenomena observed in the field and on the aerial photographs, should be utilized to the fullest extent in subsequent test drilling and other exploratory work. It should be clearly understood that some data are unobtainable by methods other than drilling or test pitting. Such factors as the exact thickness and physical characteristics of a coal or clay bed, the presence of bone and "sulphur" (pyrite or marcasite), and the quality of the deposit can be determined only by the use of these exploratory methods. Here again, however, photogeologic studies will pay large dividends. By virtue of the fact that the geologist is aware of the areal distribution of the bed, the nature and average thickness of the overburden, and certain local geologic anomalies, he can locate the test holes or pits so that the entire area is adequately and accurately sampled and explored. Photogeologic data can, therefore, be applied to great advan-

(*Continued on page* 96)

The Golden Anniversary Banquet filled the Garden Court and an adjoining room of the Palace Hotel



Worthen Bradley, toastmaster, introduced head table guests and Speaker Warren Whitney to an audience of 1250

San Francisco Meeting Marks Golden Anniversary of A. M. C.

SEPTEMBER 20-25 will be remembered as red letter days on the calendars of the 3349 mining men and ladies who attended the 1948 Metal Mining Convention and Exposition of the American Mining Congress in San Francisco, commemorating the 50th anniversary of the AMC and the centennial of the discovery of gold in California. Predictions that this meeting would be a notable success were more than fulfilled when the crowded week combining business and pleasure came to an end.

Seven years had passed since the Western Division of the American Mining Congress held its last convention in San Francisco, but the Golden Gate city again lived up to all expectations in providing the ultimate in friendliness and hospitality. As in 1941, the 1948 meeting was held under the cloud of international unrest, and the proceedings of the meeting were watched with keen interest by a public more fully aware of the importance of our natural resources as the sinews of industry in war and peace.

The keen interest shown by mining men in the 90 exhibits of mining and milling equipment and supplies and in the Convention sessions was additional evidence of the spirit of the mining industry to forge ahead, utilizing the latest developments to produce the minerals and metals required by an expanding population with a rising standard of living, in addition to meeting the nation's needs for stockpiling.

To suit the requirements of the mining industry during these critical times, the hard working Program Committee under the general chairmanship of E. S. McGlone arranged a total of 11 sessions; six devoted to subjects of general interest to the mining industry, and five covered a broad variety of operating problems. The general sessions, dealing respectively with government policies and the mining industry; the future of gold and other metals; problems under consideration by the National Minerals Advisory Council; labor relations and manpower problems; tax, traffic, and nonmetallic minerals; and new developments that are adding to ore reserves, were well attended by executives and officials of mining operations from all sections of the United States. The five operating sessions, treating with advances in milling practice, mechanization of mining operations, open-pit and placer mining, and mine operating problems, drew large numbers of executives and operating men responsible for day-to-day plant operation who were eager to follow the latest developments in methods and practices that lead to increased efficiency.

E. S. McGLONE
National Chairman

Convention delegates, throughout the week, expressed enthusiastic praise for the results of the efforts of the local and national committees who had done so much to assure the mining industry a really worthwhile meeting. Special commendation goes to Worthen Bradley, general chairman of the Arrangements Committee and Albert F. Knorp, vice chairman of this Committee; Chairman G. S. Borden, Entertainment Committee; Mrs. Carlton D. Hulin, Ladies Committee; Gordon I. Gould, Finance Committee; H. A. Sawin and P. R. Bradley, Jr., Trips Committee; Jack How, Attend-

ance and Publicity; J. B. Newsom and Bert C. Austin, Welcoming Committee, and the many members of these commitees who cooperated in arranging facilities that contributed to the success of the Convention.

Secretaries' Conference

The annual meeting of mining association secretaries, presided over by Albert F. Knorp, chairman, California Chapter of the American Mining Congress, took place Sunday at the Fairmont Hotel. The 37 men present at the all-day session discussed topics of vital importance to the mining industry, including pending legislation, both Federal and State, public land policies, rehabilitation of gold mining, exploration and development incentive, tax deterrents to venture capital, public relations problems, improved integration of association activities, and other subjects.

Convention Week Begins

On Sunday afternoon, September 19, the first flow of mining men began, with advance registration taking place at the Palace and Fairmont Hotels. On the following morning, delegates crowded the registration desks at the Civic Auditorium as the Convention got off to a formal beginning.

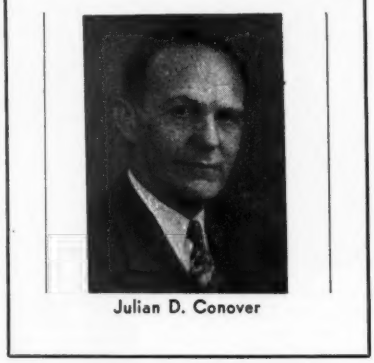
Julian D. Conover, Secretary, American Mining Congress, opened the proceedings of the Convention with some brief remarks, in which he said:

"Our meeting this week is a very special occasion. We are celebrating both a 100th and a 50th anniversary, the centennial of the discovery of gold in California and the Golden Anniversary of the founding of the American Mining Congress. That chance discovery 100 years ago of the treasure for which the Spaniards had for so many years sought in vain marked the real birth of our western mining industry. . . .

"Fifty years ago the mining industry felt the need for a national organization through which mining men might join their efforts for the good of all, and the American Mining Congress came into being. For half a century it has served the industry—both in the complex field of government policies affecting mining enterprise, and in the improvement of mining techniques for greater safety and efficiency.

"These fifty years since the Mining Congress was founded have witnessed an unparalleled growth in our mineral industries. Our use of metals and minerals during this period has been greater than the entire world consumption during all previous history, and the annual value of our production has grown from three-quarters of a billion to over $9 billion. Minerals have provided the foundation for our industrial and scientific progress. They have enabled us to win two World Wars, and they may be desperately needed again if another world conflagration should threaten our way of life.

"In order to maintain a strong and expanding mining industry, we all know that we must recreate a climate under which the risks of exploration, development, and research—on the part of the little fellow as well as the big one—are again justified. We must seek the aid of those in Congress and in the public service in clearing away the obstacles and uncertainties that deter courageous men from taking a chance in the hope of large reward. They must have an opportunity to finance their ventures, to build prospects into mines, and to operate their properties without undue burdens and harassment—whether from excessive taxes unwisely administered, arbitrary government controls, restrictive land policies, inadequate protection from low cost foreign competition, or unduly burdensome requirements of social security, labor, wage-hour, and other laws which require the miner to pay more attention to his paper work than to his ore faces.



Julian D. Conover

James Boyd, director, U. S. Bureau of Mines, speaking on the work of the National Minerals Advisory Council

Operating sessions attracted mining men eager to learn of up-to-date developments

"We need affirmative recognition of our manpower shortages; adequate allocation of steel for mining use; continued freedom from the headaches of renegotiations; encouragement of our strategic metals industries; an unrestricted market for our gold; equitable freight rates; and recognition of the special nature of mining, with sympathetic treatment of our problems."

Mr. Conover introduced Howard I. Young, president, American Mining Congress and president, American Zinc, Lead and Smelting Co., of St.

Louis, who welcomed the Convention delegates. Mr. Young reaffirmed the the forward, frank policy of the American Mining Congress to serve the mining industry and help it keep in the best condition to carry on and do its share to produce the maximum amount of material when needed. He expressed the hope that this could be done with a minimum amount of government control. He introduced Major General C. F. Robinson, executive officer of the National Security Resources Board. General Robinson's address appears on page 28 of this issue.

Welcoming Luncheon

On Monday noon a welcoming luncheon was held in Larkin Hall in the Auditorium with a crowd that overflowed into adjoining rooms. E. S. McGlone, chairman of the Program Committee and vice-president, Anaconda Copper Mining Co., presided at this memorable occasion. He welcomed Convention delegates to the extraordinary meeting marking the 100th anniversary of beginning of the mining industry that played such a dominant role in the opening and development of the western United States.

W. P. F. Brawner, president of the San Francisco Chamber of Commerce, sounded the interest of the people of California in mining and their pleasure in having the Mining Congress meet in San Francisco.

Mr. Young responded to Mr. Brawner's greeting and stated that the interest shown in this meeting and the accomplishments of mining men working in cooperation justified the foresight and wisdom of the original organizers of the American Mining Congress. Worthen Bradley, chairman of the Western Division of the Mining Congress and president of the Bradley Mining Co., expressed his thanks for the splendid cooperation given by the various arrangements committees and introduced the chairmen of each of these committees. In the absence of J. J. Huether, chairman of the Manufacturers Division of the American Mining Congress, J. H. Fulford, vice chairman of the division and vice-president of the Jeffrey Manufacturing Co., extended an invitation to all Convention delegates to inspect the largest and most complete exposition of mining equipment that had ever been displayed at a metal mining convention. He expressed the hope that the manufacturers' representatives might be of service to mine operators in helping them solve their operating problems.

Chairman McGlone introduced head table guests and paid tribute to the fine cooperation extended by the mining industry in the development of the convention program.

The Honorable Clair Engle, member of Congress from California, as guest speaker at the welcoming luncheon, delivered a forceful address on legislation affecting gold mining and stockpiling. His remarks, in part, were as follows:

AT this Mining Congress we still find the gold mining industry the only industry in the United States which has only one purchaser for its product, and that purchaser the United States Government, which fixes the price and imposes penalties upon the gold producer if he does not sell his product to the one customer, the United States Government.

Hon. Clair Engle

Many attempts have been made to get compensation for the gold miner for the losses which he has suffered as a result of the wartime gold mine closing order. The last Congress provided compensation for the Japanese nationals, who were removed from the Pacific Coast during the war, for the property losses they suffered in moving away from their established businesses. It seems somewhat ironic that Congress should do this and at the same time refuse to compensate the gold miners who were moved out of their mines.

At the Welcoming Luncheon, the Hon. Clair Engle addressed an audience representing a large cross section of the mining industry

The mining industry should not maintain a defeatist attitude towards securing relief for the gold miners who are pressed with rising costs of labor and materials against a ceiling of $35 an ounce. We should take the offensive in establishing the position of gold, not only with reference to our economic system, but also with reference to our currency, and as a product of importance to the economy of this nation. Secondly, I am convinced that unless we do move affirmatively, unless we do take offensive action with a definite program, when the move does come for an increase in the price of gold, or an adjustment of the price of the gold, we will find ourselves being penalized by Congress in the form of a severance tax, or otherwise, because we have failed to assert ourselves to make the problems of the gold miner known, to let it be known in the Congress of the United States that the gold miner today is rapidly being squeezed out of business; that on the basis of his loss in costs alone, actually is out of his pocket, WPB Order L-208 cost the gold mining producers of this country something like $18,000,000. For those two reasons we need an affirmative and definite program for gold in the Congress.

The mining industry should unite in supporting the mining committees of the House and Senate in their endeavors to develop a definite program for the mining of strategic and critical minerals and metals.

We have proposed a four-point program. We have suggested that we stockpile these minerals and metals from whatever source we can get them. The next thing is to create a real stockpile for this country, because the best stockpile we can have is the stockpile of a going domestic mining industry. That is the best stockpile you can have anywhere.

No matter how long or how short your war might be, there is always the possibility of running out of a stockpile, but when you have a domestic mining industry which is producing in this country, that stockpile is not going to run out. You not only have the exploration and development, the minerals and metals which you need, but you have kept in existence the mining know-how which is necessary to run a mining industry. We are rapidly losing it, and I propose we keep that domestic mining industry going by whatever method necessary. I think the only way we can do it, and the way we propose to do it, is by a subsidy, or premium price program. Some don't like it, but we are either going to have to do that, or we are going to have to do it through a tariff system. In my opinion, a tariff is not a practical approach to the problem.

We propose to write into legislation that the increased production brought about by this premium price, or subsidy, program be placed in the national stockpile. We urge that for this reason that there are many producers in this country who don't want to be thrown into competition in lead, zinc, copper, tungsten, or whatever, with a mine assisted by a premium price, or Government subsidy program. They don't like that kind of competition. But, by guaranteeing in legislation that the additional production brought about by a premium price program, will be put in the national stockpile and held there as a national resource, we have not interfered with the normal current of trade at all, and those people who can produce without premium or subsidy are not faced with what amounts to Government competition.

The next point in the program is that we hold these stockpiles subject to congressional release only, so that these industries in the United States which are in the business of producing minerals and metals will not be threatened with a huge stockpile hanging over their heads, fearing that by some Executive fiat, or even capricious act of the President of the United States, they may even find themselves ruined by the stockpiles being dumped upon the market and breaking their price structure.

We feel that we must have a domestic mining industry in full operation, but when we take our minerals and metals out of the ground on a premium-price basis and put them above the ground we have not lost those resources; they are still there. They are there in indestructible stockpiles, and we have not only kept our resources but we have stockpiled the manpower necessary to bring those resources above the ground and subject to utilization.

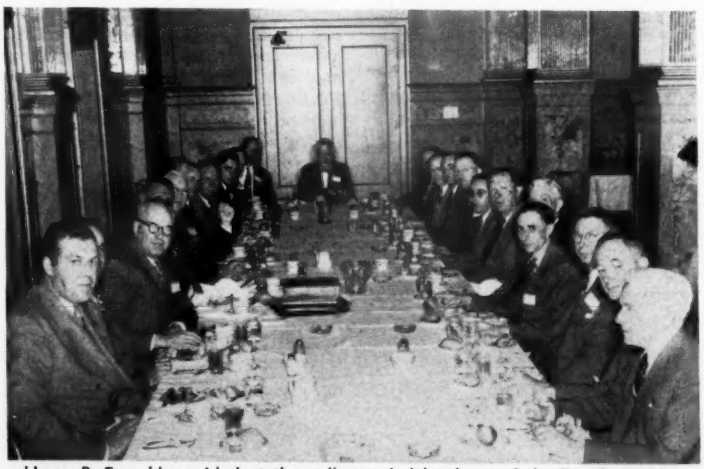
You all know the problems of manpower during the war. If we can stockpile the manpower at the same time we stockpile the natural resources, then we have killed two birds with one stone. When we stockpile the natural resources on top of the ground, that is exactly what we are doing.

So in conclusion, and in summary, I say that what we need in Washington for gold is a program, a definite program, and what we need in the field of domestic mining for critical and strategic minerals and metals is a program. If the programs which I have mentioned, and which have already been proposed before our congressional committee is not what you want, then you should suggest something else. But I am in hopes that this mining convention, having as it does the outstanding brains and leadership in the mining industry in America, can help us come to the conclusions which will be of help to us when we go back to Congress next January first.

Luncheon Meetings

On Wednesday, the Tax Committee of the American Mining Congress held a luncheon meeting with Chairman Henry B. Fernald presiding. Approximately 25 executives and tax specialists were present at this meeting where the industry's views on this important subject were discussed.

At the same time a luncheon con-



Henry B. Fernald presided at the well-attended luncheon of the Tax Committee

At the luncheon meeting of the Board of Governors, Spokane, Wash., was approved as the site of the 1949 annual meeting

Representatives of the Strategic Metals Industry discussed their problems at a luncheon meeting

ference was held by the Strategic Minerals Committee headed by S. H. Williston, vice-president, Cordero Mining Co. The strategic metals situation was reviewed by a group of 50, among whom were representatives of the principal domestic producers. It was noted that: no steps are being taken to rectify the chrome and manganese position; tariff cuts threaten tungsten; the mercury situation continues to deteriorate; but that antimony is and will continue to be in good shape so long as there are imports from China.

On Thursday noon, a luncheon meeting was held by the Board of Governors of the Western Division of the American Mining Congress, under the chairmanship of Worthen Bradley. An invitation was extended by Stanley Easton, president, Bunker Hill and Sullivan Mining and Concentrating Co., to hold the 1949 Convention at Spokane. Mr. Easton introduced James McCluskey, vice-president and manager of the Davenport Hotel of Spokane, who outlined the attractions of the "inland empire" city and the nearby mining districts. The invitation was enthusiastically accepted with the understanding that the 1949 meeting, which will not include an exposition, will probably be held the week of September 26.

D. D. Moffatt, vice-president, Kennecott Copper Corp., extended a cordial invitation to hold the Convention and Exposition for 1950 in Salt Lake City. He followed Mr. Easton's lead in sketching Salt Lake City as an exceptionally fine meeting place and gave his assurance that everything would be done to make the meeting highly successful. His invitation was likewise accepted, subject to the conclusion of satisfactory arrangements for hotel and exhibit facilities.

R. M. Hardy, president, Sunshine Mining Co., nominated Mr. Easton as chairman of the Western Division for 1949, and he was unanimously elected. William J. Coulter, general manager, Climax Molybdenum Co., agreed to serve as chairman of the Program Committee.

Mr. McGlone expressed his appreciation for the splendid cooperation he had received in shaping up the 1948 Convention and Exposition. Mr. Young emphasized the fine work of the various committees which had worked hand in hand to contribute to the success of the meeting.

Declaration of Policy

On Thursday afternoon, at the end of the 6th general session, Donald Callahan, chairman of the Resolutions Committee and president, Calla-

Throughout the four busy days the exposition hall was crowded with information seekers

Westinghouse
AT THE MINE
LINK-BELT
AT THE MILL
ROBINS CONVEYORS
GATES RUBBER CO.
WORTHINGTON PUMP & MACHINERY CORP.
Ingersoll-Rand
ANACONDA WIRE & CABLE CO.
Kennametal Rock Bits

han Consolidated Mines, Inc., presented the declaration of policy which had been prepared after serious consideration at several meetings during the Convention week. Mr. Callahan pointed out that resolutions are simply words and would have no effect unless the members of the Mining Congress make them really represent the will of the American mining industry. The Declaration of Policy, as adopted, appears in full on pages 51-54 of this issue.

Exposition—Key Attraction

The comprehensive display of minemill machinery and supplies constituted the largest exposition of its kind ever assembled for the benefit of the industry.

Every bit of available space in the Civic Auditorium was utilized to display machinery, tools, and supplies of key importance to the mining industry in improving operations and increasing efficiency to meet rising costs of labor and materials. Every open hour found operating men and company executives making a careful examination of the wide variety of displays. Manufacturers' representatives had a splendid opportunity to confer with operators on the best way of applying their products to do the job of mining better.

Entertainment Enlivened Evenings

Through the courtesy of the Commercial Club, its facilities were made available on Sunday evening, for a cocktail party for Convention Chairmen and members of the Committees. The men who had contributed so much of their time towards arranging what proved to be a Convention of record interest had an opportunity to relax, knowing that the well planned task of arranging the meeting had at last been completed.

On Monday evening, a Mining Jamboree was held in the Peacock Court, Mark Hopkins Hotel. Cocktails and a delicious buffet supper, followed by dancing and exceptional entertainment will long be remembered by the large number of mining men and their ladies who attended this outstanding affair. Tuesday evening was left open to allow visitors to enjoy the city in their own way. Various groups joined to partake of the diversified entertainment offered at famed night spots.

Wednesday evening, aboard the ferry-boat Sierra Nevada, a full crew of nearly 700 enjoyed a four-hour chartered trip which took them to many of the beauty spots of San Francisco Bay. Cocktails and a delicious box supper preceded a series of boxing matches. Tickets for the boat ride were labeled with names of various metals and the boxers had corresponding labels marked on their trunks. Youthful competitors on behalf of the various metals did their best in contributing to an exciting evening. A troupe of roving troubadours roamed about the ferry and added music and their own talented singing to outbursts of song indulged in by a happy group of seagoing miners, while dancing was enjoyed on the main deck.

Climaxing the week's entertainment was the Golden Anniversary Banquet in the Garden Court of the Palace Hotel on Thursday evening. Following an excellent dinner, Worthen Bradley, presiding as toastmaster, introduced and honored past Presidents of the American Mining Congress, Chairmen of the Western Division, and past Convention and Exposition Chairmen. He introduced Warren Whitney, vice-president, James B. Clow & Sons, of Birmingham, who delivered a sparkling address on Americanism. The keynote of his speech was that the American system of opportunity had enabled us to perfect a plan of living that holds promise to the entire world.

Following the dinner and addresses, a group of professional entertainers displayed their talents. As the Court

was filled to overflowing, the entertainment was repeated in an adjoining room for the benefit of those who were unable to see the first performance. Following the professional exhibition of skill, two orchestras provided fine dance music in each of the ballrooms.

Ladies Enjoyed Special Entertainment

Wives and guests of the Convention delegates actively participated in all of the events of the week and in addition, special entertainment was arranged for their enjoyment during the hours of the business sessions.

On Tuesday, an outing to Muir Woods took a large group across the Golden Gate Bridge through the giant California Redwoods. The trip returned home via a scenic drive through the beauty spots of Marin County. On Wednesday, the ladies enjoyed a luncheon trip across the San Francisco-Oakland Bay Bridge to the Claremont County Club.

Inspection Trips to Mining and Industrial Areas

Following the intense four days of Convention activities, many delegates took part in trips of special interest to mining men. Early Friday morning a group of 24 took off in a chartered bus for Marysville, Calif., where Yuba Consolidated Gold Fields were host at luncheon. That afternoon a visit was made to the 18-cu ft dredge working on the Yuba River. Leaving Hammonton, the bus wound up through the foothills of the Sierra Nevadas and on to Grass Valley where the party was entertained at the Club House of the Empire-North Star mine. The night was spent at the colorful Bret Harte Inn. In the morning a visit was made to the Idaho Maryland mine, where the group went underground to examine in detail the operation of the sand filling of old stopes. A fine luncheon, by the courtesy of the Alpha Hardware Co., was enjoyed by visitors and the local mining group.

Inspecting the Yuba 18 cu ft dredge at Hammonton, Calif.

Some of the party who visited the Yuba dredge at Hammonton left in private cars to spend the night at the Oroville Inn in Oroville. On Saturday morning they drove up the Feather River highway to Creston to see, at first hand, the tunnel driving project being carried on by the Pacific Gas and Electric Co. Luncheon was had at the Morrison-Knudsen Co. camp. Both parties returned via Sacramento to arrive in San Francisco about 7 pm on Saturday.

On Friday, another party drove to Sonora, Calif., for luncheon at the Sonora Inn and proceeded to Carson Hill and Angels Camp through historic Mother Lode country. After a visit at the Calaveras Cement Co. plant they went on to Volcano to spend the night. On Saturday, the Central Eureka mine was visited, and after luncheon at Placerville, the Capital Dredging Co. operation in the Folsom field, was examined.

Another group took a one-day field trip on Friday to the industrial area of northern San Francisco Bay, visiting the Selby smelter of the American Smelting and Refining Co. and the Dow Chemical Company's plant at Pittsburg, where luncheon was served. In the afternoon the plant of Fibreboard Products, Inc., was visited and the party returned to San Francisco.

All who took the trips had an interesting and enjoyable time and cordial thanks were extended to those who so generously contributed to entertaining the visitors and who had enabled the various plant inspections to be made.

Trippers went underground at the Brunswick mine of the Idaho Maryland Mines Corp.

Make Your Reservation Now

for the

1949 METAL MINING CONVENTION

Spokane, Wash.
September 26-28

Apply to Housing Committee
Hotel Davenport

A DECLARATION OF POLICY

THE WESTERN DIVISION, AMERICAN MINING CONGRESS

Assembled in Annual Meeting, San Francisco, California, September 23, 1948

declares its views upon the following matters of public policy:

AGAIN our country stands face to face with one of the moments of supreme challenge. Unless we rise to greatness our fate may well be the fate of many nations that have preceded us in history. We do not live in a Utopia and it would be suicidal to act as if we did. If we are to avoid confusion, uncertainty and fear we must recognize that not only is moral and economic force essential, but physical force as well.

The present tense international situation is such that we must have an impregnable national defense. This imposes a grave challenge on the mining industry. This industry must provide the metals and minerals for national defense, for domestic needs, and the support of a stable economy among friendly nations.

To accomplish this objective, it is vital that harmonious relationships be preserved between management, labor and Government, and that every obstacle be removed that might hamper the efficient operation of our mines and plants under our well tested system of free enterprise.

We are still faced with a scarcity of materials and supplies, and development and exploration programs have been seriously retarded by a lack of manpower. Other factors which have seriously affected the production of metals and the development of new sources of minerals and metals have been excessive demands by Government in the way of taxes and restrictive laws governing the financing of mining enterprises. These have created conditions under which risk or venture capital has not been available to the industry.

We assert that this Nation is not a "have not" nation and that our industry is not a "have not" industry. Given just laws and fair administration the mining industry will continue to furnish metals and minerals essential to our economy and national defense.

It is imperative that there be a better understanding on the part of the people generally, and of those who enact and administer our laws particularly, that the economy of our nation, the happiness and welfare of our people, the safety of the Republic itself depend upon a healthy mineral industry. To assure this there must be formulated a national mineral policy—which is long overdue—and we pledge our hearty cooperation to attain this end.

LABOR RELATIONS

Congress, by the enactment of the Labor Management Relations Act, 1947, established a labor code for the benefit of all parties: employees, employers, unions and the public. Congress acted in the public interest and should be commended by all for such constructive legislation.

Certain practices of some labor leaders still interfere with civil liberties and with the free flow of commerce, to the detriment of employees, employers, unions and the public. We believe that the Joint Committee on Labor Management Relations, created by the Act, should recommend, as part of the report to Congress required by that Act, legislation to:

1. Illegalize a strike which is called without the prior authorization of a majority of all of the employees in the affected bargaining unit, voted by secret ballot at the conclusion of bargaining and conciliation.
2. Require that collective bargaining be done on a plant or bargaining unit basis, and prohibit the concerted industry-wide strike by a combination of locals or by an International Union.
3. Make the prohibitions of the Anti-Trust laws again applicable to unions.
4. Provide for Federal injunctions upon application by private persons to prohibit the restraining of the free flow of commerce by illegal strikes, mass picketing, violence and intimidation, and similar terroristic devices.
5. Declare it to be an unfair labor practice for employees of one employer to refuse to enter upon the strike-bound premises of another employer.
6. Make it an unfair labor practice for any union or individual to interfere by force or intimidation with the right of any employee to lawfully enter or leave the premises of an employer.
7. Provide that any employee who engages in any unfair labor practice shall lose his status as an employee.
8. Prohibit compulsory union membership in any form as a condition of employment.
9. Exclude, as improper subjects of collective bargaining, union proposals encroaching on the employer's right to manage his business.
10. Enlarge Section 8 (b) 6 of the Labor Management Relations Act, 1947, to bar all types of "featherbedding" practices in industry.
11. Complete the program of purging the labor-management relationship from Communistic influences by providing that the National Labor Relations Board shall immediately take away the right of representation from any local or international union if an officer thereof is a Communist, and that the Board shall not in the future certify such union until it can prove that it has cleared its house of such influence.
12. Forbid a strike to compel an employer to recognize and bargain with a union which has not complied with Section 9 of the National Labor Relations Act and used the processes of the Board.
13. Make fully effective the principle that findings of the Board shall rest upon preponderance of evidence.

We recommend that the Walsh-Healy Act be repealed as obsolete and in conflict with the Fair Labor Standards Act.

We recommend that the Fair Labor Standards Act be amended to:

1. Eliminate the abuses and ridiculous situations arising from the recent United States Supreme Court decision relating to the payment of overtime on overtime.

2. Permit the employer to pay overtime based upon the rate of pay for the day on which the overtime is incurred, thus restoring the option which was available to employers through administrative regulations prior to the recent Supreme Court decision.

3. Define an "employee" to include any individual employed by an employer, but not to include persons classified as independent contractors under common law concepts.

4. Define terms such as: "regular rate of pay", "Executives, administrative and professional employees", "goods", "necessary to production", and "engaged in Interstate Commerce or in the production of goods for Interstate Commerce."

5. Correct the provision of the Act which appears to subject to penalties employers who may unintentionally handle goods produced in violation of the Act, so that no person would be subject to penalties for innocent conduct.

6. Eliminate those other features of the Act which now hamper production.

In view of the drastic need for production of metals and minerals for the adequate defense of our country, we recommend that those men who are engaged in the mining industry and in the treatment of the product of such mines be declared by the President to be in occupations necessary to the maintenance of the national health, safety and interest as provided for under the Selective Service Act of 1948.

TARIFFS — STOCKPILES

Adequate tariffs are essential to the domestic mining industry as protection against competitive richer foreign deposits, lower labor rates, or materials stimulated artificially by foreign currency manipulation, dumping, or the operation of foreign cartels. Based on the experience of the metal mining industry with the administration of the so-called reciprocal trade act, we recommend that that Act be not renewed and that tariff rates or formulas for fixing tariff rates be determined by Congress. In the event of temporary suspensions of tariffs on metals or minerals such suspensions should not be for periods of more than one year.

We pledge our cooperation to those agencies of the Government concerned with the administration of stockpiling legislation. We continue to advocate the accumulation of adequate stockpiles of metals and minerals from all available sources through close cooperation with industry as authorized by Congress.

Stockpiles are our first line of defense, but an active and alert industry engaged in the production of each metal and mineral available within the continental United States is the real and fundamental backbone of national defense. The preservation of at least a healthy nucleus in each metal and mineral industry is essential and no action by any agency of Government which would injure or destroy such a nucleus should be permitted.

The production of minerals is pre-eminent in insuring our national safety and well-being. Present conditions warrant an incentive program designed to foster exploration for and development of reserves, and to provide incentives to the marginal segment of the mining industry for such period as may be necessary.

STEEL ALLOCATIONS

Without adequate supplies of steel for the manufacture of mining machinery and repair parts and for maintenance, repairs and operating supplies at mines and smelters, the mining industry cannot produce the metals, minerals and fuels essential to our economy and to national defense. Increasing difficulties in obtaining needed steel supplies are jeopardizing the production of basic raw materials from our mines.

We commend the work of the Department of the Interior and its Advisory Councils in determining the amounts of steel required for mining use, and urge the prompt establishment by the Department of Commerce of a voluntary allocation program under which the necessary steel will be assured for the manufacture of mining machinery and repair parts and for the operations of the mining and smelting industry.

PUBLIC LAND POLICY

We reiterate the policy approved at many previous meetings of the American Mining Congress with respect to disposal of mineral bearing lands of the United States. In order that the national supply of metals may be augmented, it is essential that the time honored right of prospectors and discoverers of metals be protected against those who would substitute policies of nationalization or national leasing systems for the miner's location right. Only by fostering and encouraging that right will individual and corporate enterprise be encouraged in development of known metal deposits and those yet to be discovered. Specifically, we reiterate our opposition:

(1) To any leasing system with respect to public lands containing metallic minerals.

(2) To the present practice of the Bureau of Land Management of protesting and delaying the approval of applications for patent by various devices, including land classification.

(3) To the present rigid requirements with respect to proof of discovery of commercial minerals in commercial quantities, as against the formerly required proof of a discovery of mineral in such quantity as would justify a prudent locator in spending time and money in an attempt to develop it.

(4) To any further moratoriums on the annual labor requirement which has so long served as evidence of the locator's good faith in holding his locations.

(5) To the proposed Federal recording of location notices and proofs of annual labor, which would still further clutter the Land Office block books with conflicting locations which may or may not have any legal status as against the rights of the applicant for patent. The law permitting adverse claims to be tried out in courts amply protects the conflicting locator. His rights should not be litigated in the Land Department. Those states not requiring County courthouse recordation of mineral locations should be encouraged to enact legislation to this end.

(6) To the policy of the Interior Department in Alaska of creating huge reservations for small groups

of Indians with prohibition of prospecting and acquisition of mineral titles—a policy which is detrimental to the development of that great territory and of no benefit to either the Indians and Eskimos or the white population.

(7) To all proposals to cede to the various States the Federal public lands, reserved or unreserved, other than tidelands.

Affirmatively, we urge adoption by the national Government of the following policies which will encourage the investment of private capital in the discovery and development of minerals in the public domain:

(1) Restoration to public domain status of all lands which have been reserved for military purposes where they are no longer required for national defense.

(2) A review by Congress and revision of laws under which numerous extensive and unwarranted reservations have been established in the United States and Alaska by Executive order during the last ten years, to the end that the potentially valuable mineralized areas embraced in these reservations may be restored to the public domain.

(3) Restoration to the public domain of lands withdrawn for power site purposes to the extent that they are not required for these purposes in the present or reasonably near future, in order that the minerals may be extracted therefrom pending any ultimate utilization for water storage or power purposes. We also urge the enactment of legislation which will enable the location and development of lands within power sites for minerals to the extent that mining operations do not actually interfere with power use.

(4) The enactment of legislation re-establishing the ownership by coastal States of submerged lands and their mineral resources beneath the marginal seas.

(5) A more liberal attitude encouraging the development of fissionable minerals in the national interest.

(6) A study by the Bureau of Mines and Geological Survey and by mining organizations of the possible need for amendment of the existing mining location laws to encourage and protect prospectors employing geological and geophysical techniques in the search for hidden ore bodies.

BUREAU OF MINES — GEOLOGICAL SURVEY

The United States Geological Survey and the Bureau of Mines perform technical services of vital importance and great value to the Nation and to the mining industry. They are now headed by exceptionally able engineers of highest integrity in whom we have great confidence. We deplore the delay in action by the Senate on the appointment of the present able Director of the Bureau of Mines and urge prompt confirmation of this appointment.

Appropriations for personnel and for the performance of the duties of these agencies as prescribed by Congress are relatively small items in the total cost of Federal Government, and should be made available in adequate amounts to continue all their essential activities.

The Bureau of Mines should not be made the instrument for further Federal encroachment on the rights of the States by delegating to it police powers covering the operation of mines.

MINE FINANCING

We urge Congress to re-examine without delay the Federal statutes relating to the issuance of securities for the financing of mining enterprises. We feel that the Securities Act of 1933 as administered has greatly restricted the flow of venture capital into those mining enterprises which are so essential to the development of new sources of domestic mineral production.

We urge that suitable legislation be enacted to provide for loans to promising mining enterprises, thus remedying the condition brought about by the failure to reenact Section 14 of the Reconstruction Finance Corporation Act and the dissolution of the Smaller War Plants Corporation.

WATER POLLUTION

Enactment of the Federal Water Pollution Act has injected the Federal Government into consideration of water pollution problems not only in interstate streams but in waters, such as the oceans, gulfs, and branches of the sea, which may by construction be considered interstate waters. We reiterate our past position that water pollution is a local problem, the nature and extent of which varies in each locality, and the solution of which depends greatly on local conditions.

We therefore urge that Federal concern with these problems be limited to furnishing scientific aid, engineering studies, and loans in aid to States or local governments, and that police control of the problem be left in the hands of the States and local authorities where it belongs. We also urge that the mining industry cooperate with other industries and with municipalities in effecting local solution of pollution problems.

VALLEY AUTHORITIES

We oppose the so-called Valley Authorities program, which would divide our Nation into several separate regions, each under the control and dictation of a new set of appointed officers. We believe the basic principles of such authorities lead to the destruction of individual and State rights, and that the development of our waterways and the reclamation of our arid lands can best be carried out through existing Federal, State and local agencies working with private industry and private enterprise. We particularly object to the assumption by such Authorities of control over all natural resources and the operation and control of industries related thereto.

GOLD AND GOLD MINING

Restoration of gold to its historic role as a base to which the currency of this country as well as that of other leading nations may be referred is an essential step in the correction of the present chaotic monetary state of the world which is so serious a handicap to economic recovery.

We urge the removal of the present restrictions that prevent our citizens from buying, holding or selling gold, either domestically or in the foreign market. We further recommend that the present policy of purchasing gold by the United States Treasury be continued but that the domestic producer be given the choice of accepting paper dollars for his gold at the stated rate or receiving the gold back in appropriate coins, such as pieces containing one ounce, authenticated as to gold content but without designation in dollars. The price of such coins in a free market would afford a fair measure of the current value not only of the American dollar but of foreign currencies. Such sales would provide a reliable empirical means of determin-

ing a realistic price for gold which would be of utmost significance when steps are eventually taken to make currencies again redeemable in gold and properly resistant to manipulation .

We suggest that Congress provide for the appointment of a Commission or a Committee to make a careful study of the relation of gold to the currency and its proper price in terms of dollars, and to formulate legislation to implement its findings.

We again recommend the enactment of specific legislation to restore the severe losses of capital inflicted during war years on lode and placer gold miners by the shut-down imposed in a unique instance on a single industry by a government agency. To the extent they are not reimbursed, the owners should be permitted to carry forward such losses on their income tax until deducted from otherwise taxable income.

MONETARY POLICY

We continue to favor a currency with the traditional base of gold and silver, with anticipation of stabilization of the prices of these metals eventually at levels that reflect their true world values.

TAXATION

Our present Federal taxes remove practically all incentive for effort and investment in risk enterprises, including the discovery and development of additional mineral reserves. They should be promptly revised if our system of free enterprise is to function and to yield adequate production, employment and long-term government revenues. We commend the Congress for the changes recently made but further general revision is needed.

Tax laws should be framed and administered to safeguard the interest of taxpayers as well as to obtain revenue for the Government. Taxes should be imposed only by clear mandate of law understandable by taxpayers, not to be distorted by hypertechnical administrative interpretations. Doubtful questions should be resolved in favor of the taxpayer.

Corporate and individual taxes, and their combined effect, should not be such as to leave inadequate incentive for incurring risk and producing income.

In taxing dividends to individuals due allowance should be made for the corporate tax. Intercorporate dividends should not be taxed. Nothing in the nature of an undistributed profits tax should be imposed.

The maximum tax on individual income should in no event exceed 50 percent.

Taxable income for corporations or for individuals should represent only what remains after allowance for all costs, expenses and losses and allowances adequate to yield full capital recovery. Losses of loss years should be fully deductible in determining income of years of income, with the same effect as if the income year and the loss year constituted a single taxable period. Depreciation and depletion claimed by the taxpayer should be allowed except to such extent, if any, as it is clearly established that they exceed reasonable allowances. The tax benefit principle should be applied so that amounts will be considered as allowed only to the extent they resulted in a tax benefit. Costs of development, exploration and research should be allowed as part of the operating expenses of mines. In determining taxable income, time and nature of accruals should conform as nearly as possible to good accounting practice.

The excise tax on freight which was adopted as a war revenue measure should be promptly repealed. It is an especially burdensome cost on the mining industry.

Taxes, whether Federal, State or local, directly affect the quantities of minerals which can be mined, processed and marketed at a profit. They can change marginal ores into waste. Existing taxes seriously diminish or destroy incentive for prospecting, exploration and development and as a consequence fewer discoveries of mineral resources are made. Severance taxes, or taxes on gross proceeds, are particularly burdensome.

SOCIAL SECURITY

We oppose the growing tendency evidenced by some bureaus and departments of government to further socialistic and paternalistic schemes under the guise of so-called social security programs.

We oppose any increase in payroll taxes and believe that the social security tax rate should be fixed at the lowest level required to defray the essential costs of the present system.

GOVERNMENTAL EXPENDITURES

The American people cannot afford excessive or unnecessary expenditures, at home or abroad. Particularly at a time when world affairs demand a military strength adequate to assure peace, and assistance to other nations remains necessary, all other governmental expenditures, Federal, State and local, must be kept to the minimum. In no other way can our economy and our Government be maintained and our people be relieved from unbearable tax burdens.

GOVERNMENT REORGANIZATION

We commend the creation by the Congress of the Commission on Organization of the Executive Function of the Government, of which Herbert Hoover is chairman. It is confidently expected that this new agency will take full advantage of its unique opportunity to make far-reaching and authoritative recommendations to the Congress, to promote administrative efficiency, to eliminate unnecessary activities and bureaus and to reduce the shocking waste now resulting from overlapping or ill-defined functions of many governmental agencies.

FREE ENTERPRISE

Without the preservation of those concepts which are embodied in our Declaration of Independence, the Constitution of the United States and the Bill of Rights, our industry cannot meet its obligations to the Nation and the world. We oppose those social, economic and political ideologies which subordinate the individual to the will of the State. Under our system, free, private, competitive enterprise has developed the most productive nation of all history. We pledge our industry, operating under the rules and regulations of a free society, to continue to promote this American ideal.

Securityflex

takes it

LYING DOWN!

THE ESTABLISHED LEADERSHIP of Securityflex* Parallel Mine Cable in the mining industry is the result of basic superiority in construction . . . and performance.

Anti-Short Breaker Strip between conductors cuts shorts to a minimum. Adhesion between jacket and insulation, by a special process, makes a *solid block* of heat resisting rubber and neoprene around conductors. Rugged, neoprene jacket resists flame and abrasion—cable meets all requirements of the Bureau of Mines Flame Test and diameter specifications. Will not kink, twist or tear.

The cable that can take it lying down, Securityflex, makes mines safer, more efficient. Just try it . . . you'll specify it from then on. 45489

*Trade-mark

The exclusive Breaker-Strip for Anaconda Parallel Mine Cable drastically cuts shorts between conductors. Available with or without ground wire.

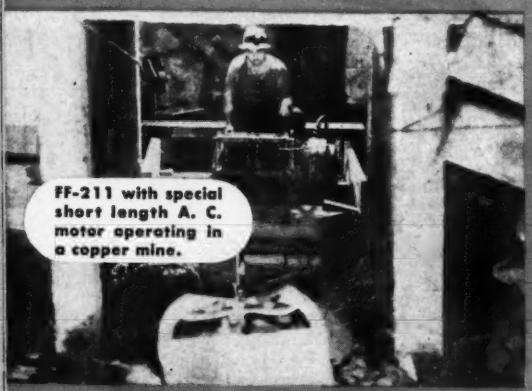
ANACONDA *Securityflex* **MINE CABLE** ANACONDA

Anaconda Wire & Cable Company, 25 Broadway, New York 4, N. Y.

Known and Used

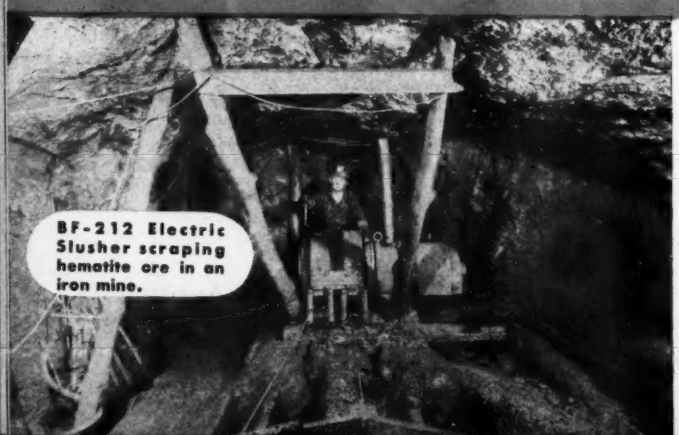
AF-312 three drum model loading pumice in New Mexico.

AAF-212 with 12 H. P. "Pistonair" motor slushing phosphate ore from a steep slope.



FF-211 with special short length A. C. motor operating in a copper mine.

S-211 "Pee-Wee" Slusher with "Turbinair" motor scraping out a small tunnel heading.



BF-212 Electric Slusher scraping hematite ore in an iron mine.

. . . JOY Sheave with safety hook and quick-opening "snatch block" construction.

WRITE for BULLETINS on JOY EQUIPMENT

the World Over-

JOY SLUSHERS

used and preferred for metal and hard-rock work . . .

because

- They are designed for this specific service
- They are built to stand hard wear and usage
- Available in a variety of models and sizes to suit every need
- Air or electric drive
- Portable and heavy-duty
- Single or multiple drums
- Automatic or remote control
- Long Life
- Low Maintenance

Consult a Joy Engineer

W&D M 2020

JOY MANUFACTURING COMPANY

GENERAL OFFICES: HENRY W. OLIVER BUILDING · PITTSBURGH 22, PA.

IN CANADA: JOY SULLIVAN OF CANADA, LIMITED, GALT, ONTARIO

Digests of Convention Papers

Condensations of papers delivered at convention sessions are published here in their order of presentation. A number of these papers will be published in full.

Government Policies and the Mining Industry

HOWARD I. YOUNG, Session Chairman

Impact of the Rearmament and Industrial Mobilization Program on the Mining Industry

By **Maj. Gen. C. F. Robinson**
Executive Officer
National Security Resources Board

This paper appears in this issue, beginning on page 28.

Impact of The Foreign Aid Program on the Mining Industry

By **Evan Just**

Director, Strategic Materials Division
Economic Cooperation Administration

THE mining industry has a direct interest in the activities of ECA's Strategic Materials Division, which implies stockpiling but ECA responsibilities have a wider scope than strategic materials or the quantity goals for the Munitions Board stockpile.

Congress has become greatly concerned over evidence of our declining self-sufficiency in regard to raw materials and over the drain on our resources created by the war and the European aid program. Thus, it wrote into the ECA Act certain provisions designed to bolster our future position with reference to "materials in which the United States is deficient or potentially deficient."

Approximately four-fifths of the money appropriated for European aid is to be devoted to grants and one-fifth to loans. The Act provides for repayment of loans, where appropriate, in deficiency materials.

Moreover, the Act provides that the administrator should "whenever practicable, promote, by means of funds made available for the purposes of this title, an increase in the production in such participating countries of materials which are required by the United States as a result of deficiencies or potential deficiencies in the resources within the United States." It also provides that the bilateral agreements negotiated with participating nations should bind them to: (a) facilitate transfer to the United States of deficiency materials, where available; (b) contract for long-term availability to American industry of an appropriate share of deficiency materials; (c) contract to grant American enterprise the same rights enjoyed by their own nationals in the development of deficiency resources; and (d) contract to increase production of deficiency materials and to deliver to the United States an agreed percentage of the increase."

ECA is not preparing to assume a dictatorial role in regard to the European economy but is relying on cooperation with the participating nations. As a result of a recent trip to Europe the programs being formulated are not alloting sufficient funds for colonial development and it may be necessary to request changes or to earmark special funds for resource development. Congress did earmark 5 percent of the grant monies for strategic materials and other local currency requirements of the United States but these funds will be used partly for procurement of strategic materials for stockpiling and may be insufficient to finance adequate development projects abroad.

In approaching the problem of resource development we are proceeding on the basis that insofar as private interests are concerned, investments which are considered to serve our ends must be underwritten if they do not constitute sound business risks. Properly conceived, the development of deficiency material resources will benefit the colonies by opening up new sources of wealth and by providing foreign exchange. They will bring investment income to mother countries and a flow of materials to these countries as well as to the United States.

The matter of equal access in development of deficiency resources has been widely misunderstood. In my opinion the local benefits from investments in resource development far outweigh what is extracted in the way of amortization and profits. American investors have a good record of providing good wages and working conditions, of fair dealing and of willingness to plow back a reasonable share of profits in new investments. Inasmuch as equal access does not imply any abrogation of existent private rights, I see no reason why the participation of American enterprise in resource development should be anything but a boon to all concerned, whether the investment is made entirely by Americans or in partnership with local people. The day is past of rapacious exploitation by outside interests of the people and resources of undeveloped areas, and it is unfortunate that the memory of that kind of activity anywhere should complicate international relationships today. If we act wisely and considerately, I see no reason why access problems should be troublesome, and believe the main problem will be to arouse a sufficient interest in foreign development on the part of American enterprise equipped with adequate capital, character, and know-how.

While the Communist press has portrayed the European Recovery Program as an imperialistic move by the U. S., the participating nations had become assured of our desire to cooperate to mutual advantage in resource development. Where private U. S. interests might not wish to participate in the development of foreign resources, the U. S. Government must be provided with authority to participate in publicly desirable foreign developments or to license private agencies on a free basis but legislation to this end must provide for relinquishment to private hands whenever a willingness to take over develops. Private interests desiring to develop materials in which the U. S. is deficient or potentially deficient, should apprise ECA of the materials and areas in which they are interested thus enabling the Strategic Materials Division to assist them in such a move and minimizing any need for entry of a Government organizaion into the development field.

The development of foreign resources as provided for in the Foreign Assistance Act offers an opportunity to lay a cornerstone for future world peace.

The Industry's Viewpoint On Mobilization

By **Ross D. Leisk**, General Manager
Sunshine Mining Co.

AFTER reading excerpts from a paper presented by Francis J. Ryley, attorney of Phoenix, before the American Bar Association at Seattle in which Ryley reviewed the difficulties encountered during the past war with manpower problems and in dealing with individuals in Washington charged with setting manpower policies, it was emphasized that, with metal requirements for any future emergency likely to be much greater than in World War II, it is important that sufficient trained and skilled manpower be made available to conduct the mining operations. In the last war the principal trouble came over the question of manpower and that curative not preventative measures were taken to meet it.

We were trying to patch up the mining industry after it had been pretty well battered to pieces by the lack of preventative measures. We tried to get men

back by furloughing miners, and not metal miners, by the way, but coal miners who were not experienced in metal mining.

We had a great many people dabbling in this manpower problem. Every little while some fellow belonging to some Commission, some possible offshoot of the Army sometimes, would come in and tell us how to fix everything up.

Ross D. Leisk

Examples of such actions were suggestions to upgrade employes, install incentive plans, and use women in mining operations. I think we can be pretty well protected on the matter of drafting men for the Army if the people who are in control of those things wish to do that. It is simple to issue a directive that will leave the men who would otherwise be eligible for the draft in the mining industry—temporarily exempt them. I don't know how it is going to work statistically, but a check on our own situation shows that while it is important, it is a relatively minor phase of the thing. Probably 25 percent of our employes fall within the present draft brackets, and about half of those would be exempt as veterans. About half of the remainder would be married, or have other dependents, and the result would be that we would get down to 6 percent that would actually be vulnerable to the present draft set-up.

I think by far the most important thing that the industry needs is to be protected in some way from labor piracy. During the last emergency, by far the greater part of the damage was done by draining skilled mine labor away from the mining districts into other defense or war projects. There was no control over it at all.

It seems to me that is one thing that is going to need some careful consideration. It is all right to leave everything on a voluntary basis, but it seems to me work contractors when new contracts are let will find it necessary to have something written into the contracts with teeth in them that will prevent depletion of the mine labor forces and their diversion into other war projects. It is all a case of what is more important. We have been told that we can't have guns and butter, too. There is a corollary to that. Our Government planners must realize that they can't have metals and take away mine labor at the same time. You have to make a choice and decide which is the most important.

The industry will cooperate to the best of its ability in meeting any demands for increased metal production, but it will have to have authority of some kind commensurate with the responsibilities placed on it.

I would most certainly urge that the manpower problems, insofar as they relate and will have an impact on the mining industry, be placed in the hands of an industry committee of experienced operators, and not scattered out through two or three dozen bureaus in Washington to become the plaything of men who have no operating experience, and who have an abundance of theories.

Bureaucratic Obstacles to a Prosperous Mining Industry

By **P. R. Bradley, Jr.**, President
Pacific Mining Co.

THE ramifications of this Nation's affairs are highly specialized and infinite in number, and where government must deal with this infinity of specialty it can do so only by itself specializing, and thus sets up those divisions of government which bear the name "bureau" or similar ones. So long as the general organization of government keeps today's representative form and so long as capable and understanding men form the framework of our government at presidential, cabinet, legislative, and higher court levels, we will find capability and efficient performance of duty in those necessary subdivisions and outposts of government, which we know as bureaus, or by any of the other names they bear.

The life thread of any industry is far more delicate and vulnerable than is realized by those outside it, and it takes little failure of government to cut these threads and but little service to support them. Their vulnerability is concealed by their very numbers, and when one expires, little note is taken—there are but few mourners at the biers of the gold mining industry, or of the quicksilver industry, to name two which are extinct or practically so as the result of government action. It is easy to show that the lethal dose was a compound of government indifference, poor judgment, and the domination of political concepts over those of national service; these are precisely the aspects of bureaucracy which we regard as the worst of government.

Blanket criticism of bureaucracy is futile and demonstrably in error, because certain bureaus do operate with efficiency, give real public service, and enjoy public acclaim. This includes some, but by no means all of those bureaus and divisions of the government directly serving the mining industry.

The following categories of bureaucratic restrictions are the most harmful:

(1) The tax laws which wholly prevent a return commensurate with the risk. "There is practically no long-shot exploration going on today. The custom once prevalent throughout the West where a handful of business men, mine owners, or the like, might pool $5 to $50,000 for some interesting, but long-shot exploration, has been practically wiped out by the operation of individual income tax laws. The formation of exploration corporations by larger ones is inhibited by the double taxation which goes against dividends paid a corporation. The restrictions of the SEC enter here also.

(2) The arbitrary and unrealistic price controls of recent years which wholly discouraged new work in a critical period, and which resulted in the dissipation of mining organizations and the frequent permanent closure of mines. Coupled with this is adverse tariff action by the government.

(3) As in the case of quicksilver, the encouragement by the government of uncontrolled importation of such quantities of metal as to drive the price down to an extreme low, an often fatal level for the domestic producer.

(4) The breakdown of what might be called social mechanics at the isolated camps of the West by a blanket application of social reform laws designed and suited only to the cure of evils of highly populated industrial areas. In 1930 certain reforms may have been overdue, but the political circus which accompanied their institution, the carefully and generously cultivated rift between the working men and his employer, the administration of the reform laws by incompetent and even treacherous individuals, have thrown even mining camp life out of gear and with consequent costly operating difficulties.

Reciprocal Trade Agreements—Their Effect on Mining

By Hon. **George W. Malone**
U. S. Senator from Nevada

THE lack of definite national or international policies based on principle or law is deplorable. We have a hodge-podge of executive orders, department rulings, and bureau regulations based upon the broad powers granted the executive department by the Congress. Influences stifling the mining industry for the past 15 years are the reductions in tariffs and import fees; government department declarations that we are a "have-not" nation; Securities and Exchange Commission rulings on issuance of mining securities; unwise taxes and the announced policy favoring purchase of foreign minerals for stockpiling.

The "flexible import bill," introduced June 1948, would make the U. S. Tariff Commission the Foreign Trade Authority with full authority to determine the differential of the cost of production based on "fair and reasonable competition." The "Authority" would have ample jurisdiction to determine the proper import fee based on principles laid down in the bill, which would then become the tariff or import fee—in the same manner as the Interstate Commerce Commission is set up to determine the proper transportation rates on interstate carriers. Under this method every nation would be the judge of its own living standards, but would be encouraged to raise its own, since no advantage in trade with this country could be gained by holding them down and when such standard in any foreign country approximates our own then "free trade" would be the immediate and automatic result.

In any national emergency it is necessary that we have an adequate stockpile

of the strategic minerals and a healthy, "going-concern" mining industry. Due to the dangerous depletion of both stockpiles and of the mineral reserves, due to the inability to continue the usual necessary development work during the war, a mineral exploration and development incentive bill was introduced as a national security measure to stimulate the production of strategic minerals until such time as a general national policy such as the flexible import fee principle would be adopted. There is also a bill, to amend and clarify the Security Exchange Act to avoid some of the outstanding abuses of the present legislation. This bill will be reintroduced and pressed during the 81st Congress.

With reference to the "Buy American" clause in the Stockpiling Act of 1946, a letter to the White House pointed out that the "Buy American" provision is the law of the land, under which the Bureau of Federal Supply in an official circular recognizes the practice of paying up to 25 percent above the cost of foreign products for the purchase of domestic materials for government use. The reply received from the White House stated: "In regard to the administration of this law, (the Buy American Act) in connection with the stockpiling program, the President is still of the opinion that the payment of subsidies to mineral producers, through either premium price legislation or the procurement of materials for the strategic stockpiles is in general inconsistent with the public interest."

Should Metal Tariffs Be Abolished?

By **Charles H. Dunning**

Director of the Arizona Department of Mineral Resources

NEVER question the importance of maintaining an adequate domestic mining industry. In Arizona mining pays over 30 percent of the taxes. In 1931-32 when copper went to 5c per pound because of foreign dumping, Arizona's mines were forced to close, and the economy of the state was thrown into chaos. The relief load cost more than it would have cost to pay a fair price for copper. Dumping continued in spite of the low price until a tariff was imposed.

An adequate metal supply is important in preventing future war, for it is doubtful if any nation today will assume a seriously belligerent attitude against a nation having a better metal supply. Reliance of allies is not sufficient because it is a fact that during a period in the last war 54 out of 60 ships carrying vital metals to our shores were sunk by the enemy.

The advocacy of high tariffs under present circumstances is questionable, but when protection is needed, as in 1931-32, it may take a long time to accomplish it.

The only sensible answer would be to suspend the tariffs on metals by not over one year at a time—certainly not three years. Then each year let proper and well-advised authorities judge whether we need foreign metals for our best economy and security, or whether further suspension will endanger our going mines and restrict the finding and developing of new mines. Metal tariffs could become an excellent stabilizer, to augment supplies when they are short, and keep the industry healthy when there is a surplus.

Future of Gold and Other Metals

R. M. HARDY, Session Chairman

Outlook For Silver And The Nonferrous Metals

By **Simon D. Strauss,** Manager of Sales American Smelting & Refining Co.

IN taking a look at the future of copper, lead, and zinc it is probable that the demand for these metals in the decade that lies ahead will be considerably higher than it was in the twenties or the thirties. The major trends of demand for these metals has moved with the central stream of industrial activity. Public utilities, construction, and transportation equipment are the main springs of peacetime demand for nonferrous metals, and the well-being of these industries is intimately tied up with the prospects for American business as a whole.

Three principal factors support a relatively high rate of consumption: the increase in population, the continuing trend towards mechanization, and the acceptance of the principle of stockpiling.

It does not follow that prices will continue to rise, or even that present prices will be maintained. If the price structure of other commodities should turn weaker, such weakness is bound to have a sympathetic influence on the metal market and prices may well react. However, prices promise to remain high in relation to levels prevailing prior to the outbreak of the war.

Two fallacious ideas about foreign production and consumption of metal have, perhaps, been given wide acceptance: that foreign production of nonferrous metals has greatly increased; and that foreign consumption of the nonferrous metals has increased in line with the increase in the United States. Actually both consumption and production of metals decreased outside of the United States between 1936-38 and 1946-48. In analyzing the foreign position one is handicapped by the incomplete nature of statistics.

Simon D. Strauss

In Central Europe, Burma, and Japan local mine production has not yet recovered from the effects of the war. Given time, however, it is probable that foreign mine production will expand more rapidly than production in the United States. A number of new deposits have been developed within the last two or three years, particularly in Canada and Africa, that will contribute substantial tonnages to foreign production.

The loans which the United States made to Great Britain, France, and other European countries in 1946-47 and the Marshall Plan have supplied the principal European consuming countries with some dollars to buy metals. However, the total tonnage of metals going to Europe in 1948 from the Western Hemisphere's countries will probably be somewhat less than in 1947. Although per capita use of metal in Europe is far less than in this country, nevertheless, the trend of consumption over any protracted period is likely to be in the same direction. Therefore, the sharp increase in the use of metals in the United States probably will be paralleled in Europe if exchange and political difficulties can be overcome.

In fact, one of the more satisfactory aspects of the outlook for nonferrous metals is the probability that about the time shortages in the United States may be expected to end, Europeon requirements should be increasing, thereby absorbing the tonnages of foreign metals which at present are being imported into this country.

The silver position is influenced currently by an entirely different set of factors than are copper, lead, and zinc. Ever since 1935, the domestic mine production of silver in the United States has been entirely withheld from the open market, since it has been sold by the miners to the United States Government at predetermined prices, which, generally, have been somewhat higher than the open market. It appears that the greatest part of the large hoards of silver in China have now been transferred into the United States Treasury. However, there are undoubtedly enormous quantities of silver in the hands of individual Indians. Another large accumulation of silver which may have an influence on the market is contained in the coins which the British government is withdrawing from circulation theoretically to be used to repay lend-lease obligations. If reports that China is considering reestablishment of silver currency are well founded over one billion ounces of silver will be required.

If we assume that (a) the United States will continue to buy domestic

silver; (b) that India will continue to place an embargo on silver import; (c) that the British will not sell any large portion of the silver recovered from their coinage; and (d) that the Chinese will not undertake to resume silver coinage then it seems probable that the silver market will see no great fluctuation from the levels that have prevailed in the last 18 months.

Status of The Strategic Metals Industries

By **Samuel H. Williston,** Vice-President
Cordero Mining Co.

STRATEGIC metal operations that were encouraged during the war have been allowed to die of neglect or have been deliberately junked. Stockpiling of many of these metals has sagged well below the irreducible minimum.

Manganese is obtained from abroad to the extent of 90 percent of our domestic requirements. The possibility of obtaining manganese for stockpiling is somewhat dim. Imports from Russia alone, of a type not suitable for stockpiling due to physical characteristics, supply twice our domestic production.

About 84 percent of our chrome comes from countries like Turkey, Russia, and South Africa. At the present time not one single chrome operation is producing in the United States.

The tungsten industry was sacrificed on the altar of reciprocal trade treaties and international goodwill. Only three properties are now supplying over 85 percent of our domestic production. With foreign material available at $23.50 per unit, there seems little if any incentive to keep domestic tungsten mines in operation.

The quicksilver industry has a current rate of production below that of the depression years of 1932 and 1933. We must count on importing over 88 percent of our domestic requirements.

Antimony is in its best position in years. At the present time, the United States is producing 40 percent of its requirements of virgin antimony metal but should antimony shipments be resumed from China, there is little possibility that any domestic operation could long continue.

The principal source of platinum metals is Russia and the gyrations of the platinum market show rather well the effect of Russian control on the source of supply. Colombian platinum production is not sufficiently flexible to take up the slack in the ups and downs of Russian shipments.

At the beginning of World War II the Germans had 50 submarines that could be detected by radar whenever they surfaced, could be detected by the magnetic airborne detector whether at or below the surface, and gave a good response to echo sounding and ordinary sound detectors. It is reported that the Russians have 250, 20 knot M-21, latest type German submarines which can neither be detected by radar, by magnetic detectors, and only with difficulty by echo sounding. If the Germans could sink 65 out of 67 cargoes of chrome from Africa, how safe are we in depending upon overseas shipments for strategic metal supplies?

Outlook for Gold in an Inflationary Era

By **Robert W. Bachelor**
Director of Research Council
The American Bankers Association

FROM 1930 through 1941 gold mining expanded and profits to gold miners generally increased. Wholesale prices were falling and wages were going down thus reducing mining costs and enabling operators to work marginal grades of ore that were unprofitable when costs were higher. The other stimulant to gold production was the rising price of gold in terms of national currencies.

This 12-year bull market in gold was accumulated by a 12-year bear market in public sentiment about gold. Gold became a relic of the dark ages. Lord Keyes, whose brilliantly insolvent economics was widely accepted in Washington, advised the United States to spend. At a time when we had idle men and idle industrial capacity, the importation of $17 billion of gold contributed substantially to stability and when war finally came to our country, we had the universally-sought-after means of payment.

There has come a reversal in public opinion concerning the worth of gold. Gold is becoming more widely appreciated. During the war years it was found that a great deal can be accomplished by a discriminating use of gold, especially in the purchase of urgently-needed raw materials.

Not so long ago our basic money was gold or silver, or gold or silver certificates which were really warehouse receipts for these metals in storage. We had a commodity money. Beginning in 1913, we have gradually shifted to a debt money. Bank deposits, representing credit, are the basis of our monetary system. Bank deposits, created when a mine operator sells gold to the Mint, when a bank buys a United States Government security, or when a merchant or a manufacturer borrows at his bank, expand the money supply. Today we have deposits and currency of $168 billions, while our monetary gold stock is only $23½ billions. About $14 out of every $100 of our money supply is represented by gold and $86 by debt.

Money serves as a medium of exchange and as a store of value. As an instrument of long-time storage, paper money may break down. Gold buried in the back yard is much more sure of having value years hence. Gold ought to be readily available for industrial and nonmonetary uses as well as for monetary purposes. There should be a market where individuals and businesses could obtain it easily and without red tape. Legislation will not change the centuries-old thinking and habits of people all over the world who regard gold as the most desirable store of value.

The present plight of gold-mining companies could be helped by a decline in prices of materials and labor, a better relationship between production costs and the selling price of gold, or a higher selling price.

The war affected every currency in the world in one way or another. Nonbelligerents found themselves with an abundance of United States dollars, British pounds sterling, and gold, but short of civilian goods. So we have inflations due to too much hard money as well as to much soft money. These inflations are a factor in making unlikely any substantial fall in wages and wholesale prices. There is little prospect that the prewar price level of 1939-1940 will return, but producers might be able to lower costs a little more through engineering research.

A better relationship between production costs and the price of gold would help gold mining. Some persons advocate a direct devaluation of the dollar, brought about by fixing some new price for gold. In a country with an inflation equalled only a few times in our history, this would be foolhardy. It would add to the money supply, and we do not need a larger money supply now. The time and place for a direct and immediate devaluation is a country with a depression well under way.

It would be undesirable to adjust by law the ratio between cost and the price of gold. The method selected must be acceptable to a majority in Congress, in the Committees on Banking and Currency, and to the President of the United States and his Treasury advisors. Under what circumstances could producers receive more dollars for each ounce of gold marketed?

A higher price of gold must not be in the form of an expense to the Treasury. A return to gold redemption of the currency now would be detrimental to the financial structure of this country. Moreover, it would not increase the price paid by the Treasury for gold, nor would it halt inflation. If the United States Treasury were obliged to redeem its currency in gold this requirement would seriously interfere with its ability to manage the public debt.

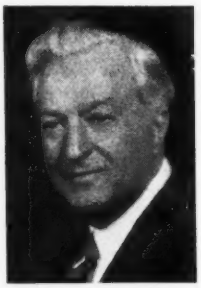
Gold production can increase by offering a higher price to producers, without expense to the Treasury, without undesirable inflationary or deflationary consequences, and without any compromise in the ability of the Treasury to manage the public debt, by restoring the unrestricted right of individuals and businesses to own and trade in, and to import and export gold in any form.

A free gold market would further international understanding immeasurably.

Since 1940, and especially since the end of fighting in late 1945, the United States has had a virtual world monopoly on industrial products. The terms of trade have been in our favor because a purchaser cannot get prompt delivery from other suppliers. A free gold market would help to ease the onerous terms of trade that most of our customers suffer. Over a long period, a free market would set the appropriate revaluation price for gold.

The number of dollars that might be offered for an ounce of gold on the open market is a matter of conjecture. Gold is worth what people, either individually or collectively, are willing to pay for it. Some writers seem to believe that an ounce of gold can be exchanged for about the same market basket of commodities now as before the war. Press accounts indicate that there is a small traffic in gold dust and small nuggets in the western states, at about $50 or $51 an ounce. Reports from foreign countries usually quote sales of gold have been between $40 and $80 a fine ounce. In most countries the indicated prices have declined during the past two years. My own opinion is, that under present circumstances, an unrestricted gold market would value gold at between $45 and $50 a fine ounce.

Restoring Private Ownership And An Unrestricted Market For Gold



By Hon. **Pat McCarran**
U. S. Senator from Nevada

GOLD producers are rapidly approaching insolvency as they are pinched between the two millstones of rising costs of production and a fixed price for their output. Unrestricted private ownership, purchase, or sale of gold in the United States would permit the operation of an open market for gold and at the same time reduce the money supply of the United States which is more than sufficient for our needs.

Foreign gold coming to this country as payment for goods becomes monetized and enables individuals to bid against each other for our limited supply of goods and service. Opposed to this, gold sold in exchange for bank deposits does *not* create new money, and immobilizes some of the existing buying power which, otherwise, would be used to bid for scarce goods and services. An open market would result in transferring newly-mined domestic gold, and some foreign gold, to private ownership. The gold that would find its way into the hands of the people would be purchased with an equivalent amount of money already in circulation. At the same time, gold would be linked to the currency in the same way that it has been since 1934.

At present gold is sold to the Treasury. It enters the monetary system when a check drawn on the Treasurer of the United States payable at a Federal Reserve Bank, is issued to the seller. The seller deposits the check at a commercial bank, thus increasing total bank deposits. The commercial bank deposits the check in its reserve account at its Federal Reserve Bank, thus increasing member bank reserve accounts and decreasing the account of the Treasury. The Treasury replenishes its account at the Federal Reserve Bank depositing a gold certificate equal in amount to the value of the gold.

The deposit of a check drawn on the Treasury, in payment for gold bullion, payable at any Federal Reserve Bank results in a maximum expansion of about $6 in loans and investments (and demand and time deposits) for every dollar of new monetary gold. If Government policy is to keep reserves under pressure to prevent undue monetary expansion, the Federal Reserve System must use whatever means are available to offset the effects of sales of gold to the Treasury.

If an open market should be established, the Treasury would not be expected to sell gold anywhere, to anyone, at any price, except to reduce bank reserves expanded by the monetization of gold. The gold stock could be frozen into the monetary structure in approximately its present status. The obligation of the Treasury to buy all gold offered at a fixed price of $35 a fine ounce, less handling charges, would be continued. Thus, this price would be a minimum for the individual owner, who could sell to the Treasury or on the open market, wherever he could get a better price.

Enactment of Senate Bill 2583 would incur no obligation to pay gold to foreigners at any time, just as there is now no such obligation. It would restore the right of individuals to exchange currency or bank deposits and the right of individuals to own gold and ship it into or out of this country without special restrictions. An open market for gold would permit individuals to appraise the fiscal and monetary policies of their Government without imperiling credit of the United States.

The steps necessary to accomplish ultimate gold coin redemption are: first, an unrestricted market for gold; second, gold bullion redemption of the currency; and, third, gold coin redemption of the currency. Gold coin redemption cannot be launched as the first step without inviting monetary and fiscal chaos. If a free market for gold is operated for a substantial period of time, it will establish an appropriate price for future redemption. The appropriate time to resume full redemption would be after a free market has afforded an opportunity to appraise and stabilize the value of gold in terms of the dollar and in terms of other currencies used in international trade.

The currency parities established by the International Monetary Fund are not realistic and soon must be altered. A free gold market would furnish a means of approximating the proper relationships among currencies of principal countries.

Black markets quote rates of exchange for other currencies and for gold that are far different from the official rates set by each country and accepted by the International Monetary Fund. These prices are not representative, but neither are the official rates, since exchange is available at those rates only under a complicated system of licenses and conditions. More gold is urgently needed abroad to assure effective currency stabilization in foreign countries. Adequate production will come only with a stabilized price, on a higher level, realistically determined by a free market.

Too low a price for gold, as for any other commodity, can result in drying up the new supply. This already has happened in many countries. Gold production in the United States is less than one-half of the prewar volume. South Africa is seriously considering subsidization as a means of continuing production. Canada has offered subsidies in one form or another.

A rise in the market price of gold beyond $35 might serve a useful purpose in reminding the public that the fundamental rules of national solvency have not been changed much in the past 15 years.

Foreigners would receive more dollars and consequently more goods than they now receive for a given amount of gold. The virtue of this is the substitution of cash payments for international subsidy and the consequent reduction of the foreign relief load borne by the people of the United States.

An unrestricted market would lift the penalty from gold producers and at the same time help put world trade back on a customer-paying basis. A new anti-inflationary device would be established if private ownership of gold should be again legalized.

The British Attitude Towards Gold

By **Paul Einzig**, Economist
London, England

THE California Gold Rush went a long way towards enabling the gold standard to operate reasonably satisfactorily for several decades. And yet, many critics argued: Given the fact that the railroads were needed, and that there were men with the technical knowledge required, controlling enough labor and materials that are needed, why should their ability to accomplish their work depend on the chance discovery of rich gold deposits in California? Why could the world not adopt a monetary system under which there would be no need for awaiting a gold rush before useful and necessary work can be proceeded with?

Other critics pointed out that sudden increases in the quantity of gold, are apt to unsettle world economy, by leading to a sudden rise in prices. They attacked the system under which the volume of money did not increase in proportion to the world's requirements, followed by long periods during which the increase in the gold output did not keep pace with the growing demand by an expanding world.

It was during the unsettled conditions between the two World Wars that the gold standard became the target of strong attacks. Mr. McKenna and Lord Keynes predicted that sooner or later mankind would realize the grave disadvantages of its monetary system being chained to gold and the resulting change would reduce the value of gold to that of scrap iron.

In spite of the immense authority of the two leaders of the anti-gold agitation, Britain returned to the gold standard in 1925. It was not until 1931 that Britain suspended the gold standard because she was unable to meet the sudden withdrawals out of her inadequate gold reserve. The change was meant to be temporary only.

Hostility to the idea of ever returning to the gold standard continued to prevail in British opinion throughout the war and after the war. The Government, however, eventually decided to go along with the Bretton Woods plan; otherwise it would not have been able to obtain the big dollar loan granted in 1945. There is now very little talk in Britain about doing away with the monetary role of gold.

At the same time there is no question of returning to the old type of gold standard, under which the volume of credit depended on the amount of gold held by the Bank of England. British opinion is now wedded to the policy under which credit should always be sufficiently plentiful to ensure full employment, and interest rates should be kept low. There is some agitation in favor of resuming the issue of gold coins but the Government is not likely to listen to such advice, as it would be contrary to its declared policy of cheap money and full employment. Since the exhaustion of the proceeds of the big dollar loan, the British gold reserve has been declining fast. So this is not the time for a return to free import and export of gold, still less for a return to free circulation of sovereigns.

Few countries besides the United States can afford an effective gold standard, even without gold coins in circulation. And for many years Britain is certainly not likely to be among them. But the British Governments are likely to uphold the principle of the monetary role of gold, and practice it so far as maintenance of a stable gold value of sterling is concerned. It is believed that the long-range upward trend in the value of gold in terms of currencies, which has been in operation for many centuries, is still in operation, even if no immediate change is envisaged.

Problems Under Consideration By the National Minerals Advisory Council

DONALD H. McLAUGHLIN, Session Chairman

The Minerals Advisory Council

By **James Boyd,** Director
U. S. Bureau of Mines

IT has become evident to many in Government and industry that our Nation must strive for closer unity in respect to policies directly influencing our productive capacities. The critical state of world affairs has added innumerable problems to Government and the mineral industry.

There are three primary topics of utmost importance as regards the national minerals policy and the functioning of Interior agencies: public lands; incentives for mining; and Government engineering and technological aid. The Minerals Advisory Council has given priority to specific phases of these questions.

One of the first reports submitted by the National Minerals Advisory Council was that of the Public Lands Committee. This report has been extremely useful and has enabled officials within the Department to orient their thinking in respect to public-domain policies. The Federal mining laws are being studied with the idea of suggesting revisions to conform with modern prospecting and mining requirements. The Bureau of Land Management has recently submitted to the Public Lands Committee of the Council a carefully thought-out questionnaire which indicates some of the intrinsic weaknesses of our present mining claims and patenting systems.

We are dealing with three questions in respect to our present system of patenting and leasing. These can be briefly stated as follows: Do our present laws, regulations, and the administration thereof encourage discovery and production of minerals on the public domain? Are they designed to protect properly the public interest? Are they adapted to the techniques of subsurface exploration by geophysical and other means which must characterize a large part of our future minerals development?

Our present mining laws are far from adequate in respect to the techniques of future discovery. Modifications will be necessary. We would like to see the Council advise in the formulation of legislation that would embody the many concepts that have been basic to the development of new deposits and the progress of domestic mining.

The entire industry is agreed that there are insufficient incentives to create a favorable climate for venture capital in mining. The entire industry is in disagreement on what incentives are necessary. The opinions within industry range all the way from bitter opposition to any Government aid whatsoever, to those who sincerely and ardently proclaim the necessity of price subsidies in one form or another as a matter of salvation, at least for their own branches of the industry. No over-all satisfactory plan has yet been evolved, and even if the basic principle had universal or wide acceptance, the methods of administration offer another field of widespread controversy. The situation must be thoroughly scrutinized, and approached with greater objectivity and with the national welfare in mind so that substantial agreement will be reached and desirable legislation can be enacted.

To proceed on the assumption that the mining industry can operate in the traditional way within the framework of an economy that existed 20, 10, or even 5 years ago is untenable, for it is obvious that the wage structure, price structure, the competitive picture and the condition of reserves have changed markedly, particularly in the postwar period. The industry, of course, must, and will continue to strive to bring about greater economies in production and marketing through improved techniques in exploration, mining, milling, smelting, refining, and transportation.

Of major importance is the need for finding and developing new reserves of ore. It is here that mining meets its greatest problems. Because there has been so little recognition outside the industry of the special nature of mining risk, venture capital is discouraged from entering into new mining development. Such capital has been especially cautious with respect to expenditures directed toward NEW discoveries and toward the development of NEW reserves.

This is a field which the Minerals Advisory Council should be prepared to explore. The obstacles to new mine operations should be laid bare and the deterring factors that adversely affect new mine exploration should be analyzed. To what extent can industry itself contribute to a solution? To what extent should it rely on action of the State and Federal Governments? Are the remedies to be sought in revision of tax laws and regulations? Do the answers lie in relaxation of State and Federal laws and regulations pertaining to issuance of securities? How do tariffs and labor legislation affect the industry?

If we believe that the national welfare is intrinsically bound to our minerals potential, the question may well be asked, "What affirmative action can the Federal Government take to improve and maintain the Nation's mineral position?"

We are in an era when the mining climate is far from favorable. Can this climate be improved? Is it possible for the Federal Government through changes in policy or direction, to enhance not only our minerals position but to encourage the search for new ore deposits? I believe that this can be done, and I think that it is in this field that the Council can render an important service not only to the industry but to the Nation.

Premium Price And Subsidies—Marginal Deposits—Stockpiles—Exploration And Development Incentives

THIS discussion was led by the following members of the Council's subcommittees, who have been studying these subjects.

By **Samuel H. Williston,** Vice-President
Cordero Mining Co.

NO national mineral policy exists at the present time. Extremists on both sides of every question have worked up the industry into a more or less religious fervor of pro and con where everything is black or white, with no grey middleground where minds might meet. It is an unfortunate thing that this condition exists since these questions must be answered and answered promptly if the mineral industry is to once more become healthy. It is not healthy now.

The following points must be included in a national policy especially in the light of national defense and national well-being:

(1) The mineral industry as one of the basic industries on which all other industries must of necessity rest, must be maintained in a healthy condition, not only for the large but particularly for the middle-sized and little operators. Since present Federal tax laws make this almost impossible, tax policy must be changed to take into account the conditions inherent in the industry, with special emphasis on permissible exploration and development expense, elimination of double taxation and reduction of prohibitive surtaxes on risk capital.

(2) For those critical metals such as copper, lead and zinc, of which we produce a large proportion of our domestic requirements, the rectification of the Federal tax policy would probably do more than almost any other one thing toward the reestablishment of healthy smaller units in the industry. To the extent that tax revision failed to supply adequate reserves or adequate production for stockpiling purposes then purchase of high-cost material, either derelict or low grade for stockpiling purposes at above the market price is well justifiable, but this should be on an open basis and not by private negotiation.

(3) The strategic metals such as tungsten, antimony, chrome, quicksilver, and manganese are strategic only because, under normal conditions, no appreciable domestic production can compete with richer deposits and cheaper labor abroad. In times of prolonged peace these metals might well be completely disregarded and the industries allowed to die. To the extent that world conditions are unsettled it is essential for defense purposes and for the defense purposes only, that a

certain minimum nucleus of healthy mining operations be carried on in these metals so that should a national emergency face the country, a rapid expansion of such operations could take place without delay. Whatever method of maintaining such minimum nuclei is adopted, it should be uniform for all segments of each metal industry.

(4) The mining industry, both large and small units, should spend more time and more money in perfecting new and better techniques of ore finding, and the U. S. Geological Survey and the U. S. Bureau of Mines should emphasize considerably their work along these lines.

(5) It must be remembered that any reduction in tariff that results in the lowering of mineral prices in this country closes some of our marginal mines, and any increase in tariff, with corresponding increases in domestic prices, opens some of our marginal mines and increases our production. This simple truth seems to have been completely overlooked by our State Department.

(6) Any policy for the mineral industry must be a long-range policy. Short-term policies only result in gutting proven mineral reserves while long term policies should encourage the development and maintenance of adequate reserves for any possible contingencies.

If the Federal Government and the mining industry agree on mineral policy it will not be too difficult to implement the policy with sound legislation.

By **Robert G. Page,** President
Phelps Dodge Corp.

IT is surely not necessary to argue to this audience the case of free enterprise versus state socialism, or to argue that a flourishing and progressive mining industry is of basic importance to the welfare of this country. Let us then inquire what suggestions can be made toward encouraging the taking of risks and improving the working of the profit motive in the mining business. The field is obviously a wide one. It includes in a greater or lesser degree almost all the topics which are being dealt with at the general sessions of this convention. To mention a few, there is:

First, the question of taxation. Taxation of mining companies and of their shareholders is a technical subject, but we can all understand that the system of taxation in effect at any one time has an important bearing on the ability and the willingness of companies and of individuals to invest their funds in the uncertain work of exploration and in the expensive process of development. The Tax Committee of the American Mining Congress has recommended various technical changes in the tax laws as they affect mining companies. In the aggregate, those changes, if adopted, would surely make mining more attractive to the investor and to the managements who must risk their funds if this country is to continue to have a prosperous and growing mining industry.

Other changes in the system of taxation which should be made to encourage

By **O. W. Bilharz,** President
Bilharz Mining Co.

COOPERATION between the mining industry as a whole and the National Minerals Advisory Council and the Department of Interior is needed to promote better understanding.

Whether we like it or not, the mining industry must concern itself more seriously with the problems of government in the procurement of the strategic and the critical metals and materials necessary for the maintenance of our domestic and military strength. If the prosperity of our domestic industry is crippled by improper regulations brought about by inadequate advice from the mining industry, then the current trend toward national shortages will continue, and our dependence upon foreign sources of supply will grow, however insecure we found these sources to be in times of war. This is a sound reason for sincere cooperation in planning, both by the mining industry and government, to work out a solution that will do the most good.

There must first, however, be accord and cooperation within the industry. The deliberations of the Council during the past year have left grave doubts in the minds of many as to the effectiveness of that body to represent all segments of the industry. It has been said that the noncooperative and destructive attitude exhibited by some members of the Council, both in and out of session, has not promoted the harmony so necessary if the mining industry is to be impartially represented by the Council. Many marginal operators feel that the Council failed to develop a constructive policy toward the proposals and recommendations for incentives to prevent loss of mineral reserves through abandonment of wasteful mining. There are strong feelings that the Council failed to suggest ways and means of administration to the Department of the Interior when it approved conservation incentives, because there were obstructionist influences exerted by the widespread and diverse elements of the industry which prevented the Department from approaching the question factually. Much criticism has also been expressed that the industry and the Council did not sufficiently recognize the interests of the domestic marginal producer in the matter of ECA's subsidizing foreign production of strategic materials in preference to our own domestic production. There is room for a great deal more harmonious cooperation within the industry if we are to maintain the confidence in the integrity of the Council on the high plane demanded, and if sound constructive advice to the Secretary of the Interior is to be formulated.

Congress, when it reconvenes, will likely take further action with respect to the questions of premium prices and subsidies, how best to protect and develop marginal deposits of strategic and critical minerals, and decide what action is necessary to be taken to build up our inadequate stockpile of these materials.

The industry and Council members should devote more time and realistic thinking upon the problems of the industry and as a result formulate the constructive advice necessary. Recommendations of the Council, forthrightly carried out, will give the Secretary of the Interior, as custodian of the nation's minerals resources, the information and guidance that he called for. Cooperation by industry to carry out the recommendations of the Council will then enable the Secretary of the Interior to efficiently, impartially, and quickly adopt the realistic minerals conservation program that will be consistent with a sound public policy and with the national defense needs as well.

One of the quieter moments at the registration desk

a continuing flow of capital into mining enterprises include: giving the mining investor the right (as in Canada) to deduct a certain portion of his dividends as depletion not subject to taxation even though the dividends are paid from earnings; elimination of double taxation of dividends; and revision of the capital gain and loss provisions to put them on a fairer basis. Also pare down Federal expenditures.

In the case of many metals and minerals, adequate tariff protection is of first importance as an incentive to exploration and development, but there must be also a reasonable assurance that the tariff will continue in effect. Any consideration of exploration and development incentives should put the administration and the revision of mining laws fairly well up toward the head of the list.

Lastly, and I would put it a bad last—we have the question of direct governmental aid in the form of subsidies for exploration or development. I should say at once that, when I am talking about governmental aid, I am not talking about work that can properly be done by the Bureau of Mines. There is a large field in which the Bureau of Mines can undoubtedly be of great assistance in the matter of exploration for and, to some extent, the development of mining properties. I have in mind particularly the matter of development of techniques. Surely there are possibilities in the improvement of the techniques for finding ore, which in many respects must still be in their infancy. No doubt there is also room for improvement in mining and metallurgical practices which will add to the country's reserves by making commercial ore out of what cannot now be profitably treated; such improvement is taking place, all the time, all over the country, in the mines, reduction works and refineries, but it is at least possible that great forward steps will in the long run be made through so-called pure research. Research of this character may well involve substantial sums of money which the Government could quite properly spend through the Bureau of Mines, possibly by means of some cooperative arrangements with educational institutions who showed during the war what they could accomplish in research when adequately financed.

The question of the use of governmental moneys, to be paid out under Government supervision, for expenditure by private interests on exploration, is a difficult one. One may well ask whether this is not one of the programs which, even if otherwise desirable, the country ought to decide that it cannot afford under present conditions. Aside from the question of principle involved, the administrative difficulties are so large as to make one doubt whether any such program could be worth its cost. Personally, I have always felt that a group, like the mining industry, which believes in free enterprise and opposes State ownership of the means of production, ought to be extremely wary of any proposals whereby governmental moneys would be spent by private interests for exploration for minerals on public lands.

By **Endicott R. Lovell,** President
Calumet & Hecla Consolidated Copper Co.

THE national welfare should be the sole consideration in developing any plan involving government aid to the mining industry.

We must face the inescapable fact that something must be done soon to encourage exploration, development, and production. While we are wasting costly time arguing and searching for the perfect plan, mines are closing, reserves are being lost, and exploration is lagging.

Agreement with Bureau of Mines Director James Boyd that virtually the entire industry is in disagreement on what incentives are necessary to benefit the mining industry was expressed. Inflated wages, supply costs, and freight rates are keeping pace with metal prices and the position of the marginal producer remains precarious. Any softening in metal prices would leave the marginal operator no alternative but to resort to costly curtailment or to permanent shutdown.

The need for adequate incentives becomes more apparent when we realize that they are necessary not only to increase production, but actually to maintain existing production. Many mines are just barely hanging on. They have reduced or eliminated essential development and have resorted to gouging richer portions of their ore bodies. Unless corrected soon, this unhealthy situation will lead to the irreparable loss of valuable ore reserves.

Producers who advocate subsidies will be doing the whole program a disservice, if they hope to get a free ride on the gravy train. While they are entitled to protection, they should receive only their costs, plus depreciation and depletion, and a small profit. Any subsidy and explorations to be effective should be of sufficient duration so that mine operators can intelligently plan their programs far ahead. They must be so designed that inefficiency and abuses will not be underwritten.

The importance of development and exploration incentives cannot be over-emphasized. There is no question but that such encouragement will result in the discovery of important additional reserves.

The high cost of exploration ventures, the hazards involved, the scarcity of risk capital, and Government tax and security regulations have made it almost impossible for the small mine operator to engage in exploration work. This is leading to the gradual liquidation of the small explorer and operator.

While we recognize the necessity for building up government-owned stockpiles of strategic metals, it is difficult to understand how significant tonnages of copper, lead and zinc, for example, can be acquired in the near future without seriously upsetting the civilian economy. If the government is willing to pay the cost, however, I believe the production of some mines could be increased, many old mines could be reopened, and new mines started.

In normal peacetimes the foregoing arguments for Government assistance would have been unthinkable. Today, however, we are facing an abnormal situation, and any return to prewar conditions is highly improbable. This calls for a drastic readjustment in our thinking. We are entering a tense and probably lengthy period when the country's mines should be straining to produce more than ever before. We can expect ever-increasing military demands for more metal. The Marshall Plan will siphon off a sizable chunk of our production. The civilian economy will take what it can get. In the face of the grave international crisis that confronts us, can anyone doubt that the nation's welfare requires prompt, unselfish, and intelligent action?

Let me emphasize that here is a definite challenge to the mining industry—a challenge to compose its differences and agree on a comprehensive incentive program, even though it may be far from perfect. Let us have action! Time is running out.

By **Worthen Bradley,** President
Bradley Mining Co.

AT a meeting of the National Minerals Advisory Council in late April the Committee on Exploration and Development Incentives submitted a hastily drawn resolution which was tentatively accepted with the understanding that it would be reconsidered at the next Council meeting (September 24).

The resolution stated, "We believe that metal and mineral exploration should be increased, and that would best be brought about under free enterprise by equitable tariffs, adequate manpower, and improved taxation.

"These would ordinarily be sufficient incentives; but if incentive production payments are legislated, we recommend adding to them a system of incentive payments for exploration.

"We also recommend that the Bureau of Mines prosecute more vigorously developments of exploration technique."

The second paragraph is of major interest. What we had in mind, of course, was the system of payments for production and development—in other words, the Premium Price Plan—as applied during World War II. This proved workable, but none of us were impressed by the tonnage of ore reserves it may have added. At this point I will frankly admit that most of us have a strong prejudice against government aid and/or interference, and a correlative passion for industry's assuming its own burdens whenever possible.

You will note that our resolution says "*if* incentive *production* payments are legislated, we recommend . . ." etc. This points up a major difficulty of this whole question of exploration incentives. They seem inseparable from production payments, and personally I think should have been considered along with those payments by the Premium Price Committee; although I realize that that already overburdened group may not be grateful to me for this opinion.

It seems difficult to envision or formulate an exploration incentive payment plan without reference to mines, or at least areas, that have some production record. Otherwise it is obvious the field would be wide open, the "no limit" sign would be up, and human nature being what it is—well, I need not enlarge on that.

But, you might say, what about mar-

ginal areas with little or no production, areas favorable geologically, in which blind ore deposits may be found, etc.? It is my opinion, and that of several of our committee, that such exploration is the proper function of the Bureau of Mines and of the Geological Survey; and that these agencies should be adequately financed and equipped, and morally supported by industry and government.

By **E. H. Snyder,** Vice-President
Combined Metals Reduction Co.

TRIBUTE is paid to Dr. Boyd and the Bureau of Mines for their earnest but unsuccessful efforts to develop a sound incentive program to create a favorable climate for venture capital in mining. *It is important that virtually the entire industry is agreed that there are insufficient incentives to create a favorable climate for venture capital in domestic mining.*

Our best informed mining engineer made a casual survey in this connection during the past summer by asking the managers of several of the more profitable Rocky Mountain underground mines that, assuming they had their present geological knowledge of their respective ore bodies but no development or plants if it would be good business under present conditions to invest the capital that would be required to develop and equip the mines and build the necessary plants to operate them. The answers were generally *NO*, and the conversations in most cases were channeled to the subjects of the withering effects of taxes, and the high cost of equipment and construction.

With such condition existing in connection with the more profitable mines, little thought is required to understand the reasons for the cries for help from the small operators who are trying to make prospects into mines, or those of the owners of developed marginal deposits who read about *the billions in gifts abroad, the metal famine, the grand plans of the State Department to favor foreign mineral development, $188,000,000 for destroying surplus potatoes, foreign metal sold in American markets at prices substantially in excess of the prices on which domestic ores are purchased, another round of wage increases, and also rumors that the faithful highly rated character known as the law of supply and demand was "locked out" and not on a vacation.*

The problems of the small operator, the development of new mines, and the conservation of marginal domestic mineral resources should be given special attention by the industry.

These problems are many and cannot be cured by a single act of Congress. Conflicts between the economic interests of the various segments of the industry will continue to plague us, but we must not let these reduce the cooperation your association requires to solve the many problems on which there is no serious difference of opinion as to methods. For example, the driving for a major revision of the tax laws so that venture capital may have a living wage.

Many futile atttempts, during the past three years, to get agreement on the matter of metal subsidies in groups smaller than this, cause me to assure you that I intend to submit no specific program to this audience. However, I am convinced that a direct Government subsidy of some form will be required to restore and maintain ore reserves.

Many in the mining industry abhor the word subsidy, but the reckless and capricious manner in which the State Department has ruined our domestic mercury industry, and seriously damaged our tungsten operations, has recently served as the final straw to convince some rugged individualists that the mass of handicaps placed on them during the past 16 years (many of which appear permanent), make direct subsidies the only logical means to perpetuate their industry. They should not be conscience-stricken in this connection, however, as the farmer, shipowner, and air lines have long received subsidies to permit them to properly serve the Nation, to say nothing of the wonderful gifts to the foreigners in the interest of defense.

I sincerely hope that nothing I have said today will cause anyone to think that I favor any form of subsidy that will guarantee profits to the producer of rock, that will handicap that portion of our industry which requires no help, or that will destroy the efficiency of our free enterprise system.

By **Howard I. Young,** President
American Zinc, Lead & Smelting Co.

A FINE record was established during the war by the mining industry in supplying needed metals and since the war a lot of problems have arisen. I am in favor of helping the Minerals Advisory Council in working out these problems. There are a lot of things the government can do and should do that industry cannot do.

It is suggested that the government should drain flooded mining districts where substantial tonnages of lead, copper, and zinc could be produced if properly drained. These districts are represented by a large number of operators, and those operators should, however, reimburse the government through a royalty on the expenditures made, based on the value of the minerals they take from the property. That is one job I think that all of us in the metal industry or mining industry will agree upon, that the government should get in and do. No one individual company can afford to go in and put in the equipment to do that job.

The program of finding out the most practical metallurgical process for the recovery of alumina clays should be carried on, either by a division of the government or by a contract from the government to a research organization that has the know-how to do the job, so that if we have an emergency, the Bureau of Mines will have on its shelf the best known processes to do the job. Development of a process to beneficiate the low-grade manganese deposits of the U. S. should be pushed.

The domestic production of copper and zinc is as high as it reached at any point during the war period but domestic production of lead is not. Instead of our thinking that it is necessary to have a subsidy for securing these metals, it was found in the course of the discussion on this subject that we already have a law, one which Senator Malone mentioned yesterday, where the Munitions Board can pay for minerals 25 percent or more in excess of the world market. The world market in all these metals is no less than the domestic market. Anyone who has a marginal deposit or new mine of metals that are needed for stockpiling can no doubt find a market and make a contract from one to three years and all of it would go into the stockpile. That is one thing we found when discussing this subsidy question this year.

As to incentives for development, tax adjustments and tariff protection are necessary. The Reciprocal Trade Treaties do not give adequate consideration to the problem that we are dealing with. In other words, they take action and then look at the picture afterwards, so far as we are concerned. We must have a tariff policy that will protect those metals that need protection. We may have periods from time to time, such as with lead and copper, where it is advisable for the industry to say to eliminate the duty temporarily. Those things can be handled, but certainly should be handled on a short-time basis.

I think the two things that will encourage venture capital in the development, more than any other, are taxes and tariffs. I do know that the high cost of development makes it difficult to carry on the projects that you would like. I know that when the mining companies were making profits during the war a substantial percentage of that was taken as taxes. I have felt, and still do, that some method should be developed to help in the development program of known ores. But if you will talk today with the Army-Navy Munitions Board representatives, if you have indicated a tonnage of lead, you can sell it over a three-year period at a good price so you can get the money to develop. That same thing isn't true on zinc today, because there is more zinc production in the United States than we have refining capacities for just at this time.

Public Lands Problems

By **Charles F. Willis,** Chairman
Subcommittee on Public Lands, National Minerals Advisory Council and State Secretary, Arizona Small Mine Operators Association

IN a survey of the problems of the mining industry relating to its dealings with the Bureau of Land Management of the Department of the Interior, it was notable that in the hundreds of communications received by the committee, there was not one that endorsed the current policies of the Bureau of Land Management or which approved of the present Public Lands program of the Federal Government.

The problem which probably was mentioned most frequently related to the

delays and difficulties encountered in securing patents. It seemed to be the feeling of many that the excessive red tape and delays have been created deliberately in order to continue to hold in public

Chas. F. Willis

ownership as much mineral ground as possible until a system of nationalization and leasing can be developed. The mining industry, through state and local associations and through the American Mining Congress, has gone on record many times as being opposed to a general leasing system. These delays in acting on applications are said to cover applications for mining claims, millsites, homesteads, etc., and often result from overtechnicality in the administration of rules and regulations and sometimes from a do-nothing policy which leaves applications neither granted nor denied for a period up to ten years or more.

Frequent mention was made of the current requirements relative to discovery. It is felt that these should be liberally applied in the interest of protecting and encouraging those venturing money and time in the further development of present districts or new areas.

Charges were also made that the Interior Department had, in many instances, substituted for the statutory mining laws administrative regulations which nullify the general mining laws and the general land laws. Many individuals advocated a provision for locating mining claims and issuance of patents based on geological or geophysical inferences.

The survey also mentioned other problems including the need for clarification of the rights of lode claim owners under the Taylor Act; inequity of Forest Service regulations; improvement of regulations covering prospecting and mineral development on Indian lands; opposition to the transfer of public lands to the State—or any change in present regulations to eliminate ultimate private ownership; desirability of making mandatory the recording of affidavits of annual assessment work; and the advisability of the government's undertaking an expanded mineral exploration program of favorable areas, together with the expeditious publication of the results. Many pointed out the advisability of opening for mineral location all public lands once withdrawn for reclamation and recreation pro'ects, or wartime uses, but no longer needed for such purposes.

As a result of this survey the Public Lands Committee made the following recommendations:

That one or several competent and experienced mining men be placed among the top rank policy-making executives of the Bureau of Land Management; and

That a study be made of existing policies and practices with a view of determining what changes are necessary to get back to the plan and program upon which the present domestic mining industry was founded and developed; and

That the laws of the country be lived up to as written and if changes are deemed as desirable they be made by Congress rather than the Bureau of Land Management; and

That the basic philosophy of the Land Department be aimed toward expediting the exploration and development of our national resources by private capital; and

That the present policy trend pointing to an ultimate program of nationalization and socialization of the domestic mining industry be reversed unless and until so ordered by the Congress of the United States.

It is further recommended that withdrawn lands or portion thereof be promptly reverted to the public domain when the purposes for which they were withdrawn have ceased to exist or when the lands no longer serve the purposes that brought about the original withdrawal; and

That legislation be sought providing for a method of locating mining claims on the evidence of geophysical or geological reasoning and also providing that geophysical and geological work be accepted as assessment; and

That legislation be sought which would make it a requirement to record assessment work and thus continuously give public notice of intention to hold unpatented mining claims.

It is believed that the new Director of the Bureau of Land Management, Marion Clawson, has a sympathetic and constructive understanding of the public problems and difficulties of those who deal with the We all hoped that the law would prove ef- Public Lands Administration. It is felt that he will improve the situation if he is given the opportunity to do so and the backing of the industry in finding proper and equitable answers. He needs, however, more than having the problems and possible answers called to his atttention. He needs the insistence from the field that solutions to the problems be found and found quickly, and recommendations, backed by universal and forceful demand of the industry, that there be a change in the present philosophy of those who administer public lands problems.

Labor Relations—Manpower Problems

J. C. KINNEAR, Session Chairman

Experience Under the Taft-Hartley Law—What Further Legislation Is Needed?

By Hon. **Richard M. Nixon**
Member of Congress from Whittier, Calif., and of the House Committee on Education and Labor

CONCERNING labor-management relations history, the reason for the Norris-LaGuardia Act and the Wagner Act was the same that brought about adoption of the Taft-Hartley Act—it was the swing of the pendulum. The growth of labor unions under the first two Acts from 3,000,000 to 15,000,000 in membership and the abuses by labor leaders, had their first repercussions in the enactment of the Hobbs Anti-Racketeering measure and the Lea Act directed at Caesar Petrillo. The mild Case bill was vigorously opposed by labor leaders during the 79th Congress, but passed by both House and Senate and thereafter vetoed.

The reason for the enactment of the Taft-Hartley Act was quite apparent. The public had come to the conclusion that the pendulum had swung too far and it was necessary to adopt a law which would swing it back—not completely to the side of management, but some place in the middle, where the rights of management on the one side and labor on the other would be balanced, and the rights of the general public recognized.

Labor leaders made dire predictions that the Act would mean the end of legitimate union activity; that it was going to make slaves of the American laboring man; bring back the "yellow dog" contract and government by injunction. Those of us who worked on the bill knew that these charges were false . . . because we knew that the bill . . . had not gone nearly as far as many representatives of management and as some members of Congress would have liked for it to have gone.

In the first year of the Act's operation the country experienced a 16 percent reduction in the number of strikes, a 36 percent reduction in the number of manhours lost by strikes and a 48 percent reduction in the number of men involved in strikes. Today our production is at an all-time high because industrial strife is at a low point, and from the standpoint of the public, the individual working man, and the labor union leaders, the conclusion is that "the bill has panned out."

The provision of the Act which finally broke down the National Labor Relations Board and set up a General Counsel's office which was independent of the Board is the most salutary of all. A body blow was dealt by the Act at the indefensible practice of jurisdictional strikes and the secondary boycott. The section which allows the President to use injunctive procedure where a strike affects the public health and safety deserves praise. This power was very effective in the coal strike and in the strike at the atomic energy plant in Oak Ridge.

Among possible changes in the Act by the new Congress, abandonment of the union shop election but a requirement calling for union compliance with the filing requirements of the Act before a union shop can be negotiated is recommended.

On industry-wide bargaining it was stated that the subject of industry-wide bargaining when it comes before the new Congress will probably result in just as much controversy as it did in the last Congress, but . . . the tendency probably will be that, in the event amendments are adopted in this field, they will be more toward getting rid of the specific abuses of industry-wide bargaining, rather than abolishing it altogether.

On the matter of strikes to compel violation of the Act in effect, it is understood that NLRB General Counsel Denham is prepared to recommend to Congress a provision which would put the strike to compel a violation of the Act

in the same category as the jurisdictional strike and the secondary boycott.

Of mass picketing the question was asked, What remedy does an employe have who is kept from his job and who is in effect forced to participate in concerted activity by reason of a mass picket line? It was pointed out that consideration will be given to a provision which would in effect apply to unions the same rule that is applied to employers in the case of unfair labor practices. Where an employer discharges an employe for union activity, and the case is made against the employer, the employer is required to recompense the employe for wages lost during that period. With a similar provision applying to unions, the union will have to recompense the employe for the loss in wages which he suffers when he is kept away from his job by mass picketing.

The next Congress is expected to consider an amendment to the Wage and Hour Act, similar to the Goodwin bill, to correct the present "overtime-on-overtime" situation. Such an amendment would have a good chance for passage, for the same reason that the Portal to Portal Pay Bill was adopted by the last Congress, because the same principles to an extent apply in the case of overtime-on-overtime.

Maintaining Industrial Peace—Handling of Labor Disputes

By **Almon E. Roth,** President
San Francisco Employer's Council

THE Taft-Hartley Act represents a reaction of the public to abuses that grew out of the favorable treatment given organized labor during the war. Representative Nixon is without doubt, without any question, one of the most effective members of Congress today, and that is because he has courage. He stood up there and fought for principles, despite the fact that labor was threatening to liquidate every Congressman who came out in favor of the Taft-Hartley bill.

Despite all the hue and cry about the Act being a "union-busting measure and slave law," employers have been going right ahead every day, recognizing unions, whether legitimate or not, and attempting to deal with them collectively—there has been no breakdown in the collective bargaining process. The rank and file are convinced that this bill has not done anything except curb some excesses like the secondary boycott, the demand for closed shop, accompanied by the secondary boycott and jurisdictional strikes.

Collective bargaining is a "pressure game," that unions have to get something for their members. Even the most conservative union can't exist unless it brings home "that bacon" from the representatives of management—that the finer the conditions, the higher the wages, the tougher it is for the union to justify its existence.

Whether it is Bridges, Green, or whoever, the most conservative labor leader in the world still has to bring home the bacon to its members and he has to be just as productive from the standpoint of union progress and has to be just as effective a labor leader as the fellow behind him who is trying to get his job. They are elected to office and hold it by virtue of what they get for their men. There is compulsion continually upon these fellows as labor leaders, and that is going to continue under the Taft-Hartley law, no matter how it is amended or what you do under it.

Congress passed this law largely because of its fear of the damage to our economy and social structure which results from national emergency strikes. We all hoped that the law would prove effective in preventing such strikes and in some cases it has.

A union can no longer come to the employer and merely hand him a closed-shop contract, irrespective of the rights to organize, and then go out and put on a secondary boycott. Thus the relief that we have gotten from the evils of the organizational strike has been helped to some extent by the outlawing of the closed shop demands, which was just a lazy man's way of organizing a union, and by the outlawing of the secondary boycott.

Communists are smart enough to work within the framework of collective bargaining, making gains for their members, and they hesitate in all these instances to throw out leaders who have succeeded in getting them certain benefits and concessions out of the employer. Not every fellow who is a good labor leader and fights hard for the union is a Communist. Some of the toughest fellows are not Communists. Don't make the mistake of calling every tough union official and agitator a Communist, because you are going to find it will rebound against us. But where you do know that a man is admittedly a Communist, a man who is committed to burn down your plant, you wouldn't hire him. By the same token, why hire a man striking against the enterprise or destroying the system of government under which we live.

The Act gives employers a marvelous opportunity to carry the facts directly to their men by communications direct to them at their homes, which explain the problems that the plant or industry is confronting, going into the details involved in collective bargaining and threatened strikes. The General Electric Co. is doing a magnificent job in that field. General Motors has done a fine job. The International Harvester has done a fine job. At a number of meetings of employers within the last three months, universally the testimony has been that it is worth while and effective for employers to take advantage of this new freedom of speech for employers, to communicate directly with their employes.

While recognizing the disadvantages that can come from nation-wide industry bargaining, we in San Francisco believe there are a great many advantages in industry bargaining. Congressman Nixon's suggestion to strike out at monopolies whenever they occur, whether on a local basis or national, rather than to blindly say that all bargaining must be confined to one employer and one employe is a good one. Monopolies can be cleaned up through the anti-trust laws if they are amended, so that both unions and employers are equally amenable to them.

The important thing is for employers to be fair. Otherwise we give ground to these fellows for their demands and claims. We must be fair, but above all, be firm. The Taft-Hartley law hasn't solved our problems. Labor must still be met across the bargaining table. If we are fair we can afford to be firm and can then count on public backing. If we don't, gentlemen, we lose our shirts.

Personnel, Safety, And Public Relation Problems of The Mining Industry

By **W. E. Jones,** Personnel Manager
Climax Molydbenum Co.

PERSONNEL, safety, and public relations problems have advanced during the last 15 years to the point where they are among the first considerations of a mine manager, when he is considering ways and means of reducing the cost and improving the efficiency of his operations. By far the majority of the mining districts in the United States are today experiencing a definite shortage of skilled underground workmen and in some areas a shortage of acceptable inexperienced workmen exists. As to personnel programs, the management of a company must first analyze its own attitudes, policies, and objectives in regard to its employes and the community in which it operates, and then come to an agreement on the definite policies to be followed. Once these proposed policies have been determined, the next step is to see that the people affected understand them. It is essential that these policies be accepted at all supervisory levels and that once these policies regarding employe and community relations are operating, it is advisable to organize a program for evaluating not only the employe's but also his family's attitude toward them.

Satisfied employes want to feel secure in their jobs, and to know that if they do their part, the company will, in turn, do all it can to give them steady employment; a reasonable chance for advancement to secure more desirable and better paid jobs; wages in line with those for similar work in the district; group insurance, recreation, medical plans, pensions, and paid vacations; a feeling of belonging on the team. They want to know that their work, however insignificant it may be, is an important part of the entire operation; and an explanation of business prospects and of some of the company's problems. Over all, the company management must be fair, sincere, reasonable, and considerate in its dealings with employes and their families.

Safety problems, considered as engineering problems, may receive real aid from state mining departments and the U. S. Bureau of Mines. It is necessary to get company management and supervisors to realize the importance of safety and industrial hygiene programs and to convince employes of the value of safety and industrial hygiene programs.

The mining industry has failed to appreciate the advantages and importance of good public relations. The following methods are suggested to inform the public concerning the industry:

(1) Arrange plant tours for various business and civic organizations as well as wives of employes that will give them a clearer understanding of some of the major problems involved in the operations.

(2) Mail informational letters periodi-

cally to community leaders and also to employes who will spread the information.

(3) Prepare suitable press releases regarding such things as employe activities and company plans, prospects, and policies.

(4) Arrange for a booth at a state fair or similar local functions where information and exhibits of company activities are available.

(5) Invite reporters in and see that they obtain factual information on newsworthy events.

Attracting Men to The Mining Industry

By **B. E. Grant,** General Superintendent U. S. and Lark Mines, U. S. Smelting Refining and Mining Co.

SHORT of a major recession, competition in the over-all labor market is not likely to decrease. There must be increased effort in competing for labor and we must first endeavor to reclaim those men who were skilled in the mining trade but who now are engaged, as a result of wartime transition, in other trades. Although an individual operation may benefit temporarily, the problem is not solved by attracting miners from one mine or one mining locality to another. The transient miner makes a poor employe and lowers the over-all quality of a working force. Secondly, we must gain new recruits and train them to become skilled employes; and third, we must conclude that we can't solve our manpower requirements overnight.

The problem is one of more aggressive public relations and of levelling attention on the youngsters coming of age in the communities that surround the mines, mills, and smelters. Those communities depend upon the mining industry for their major source of tax revenue and the dominating opinion in these communities directly affects our operation; helps shape our labor policies; and determines whether the young men enter our field or seek elsewhere.

The mining industry should send its representatives into the field to discuss problems and accomplishments with community civic clubs and other groups; not forgetting that the women are just as important as the men. The Utah Mining Association is sponsoring a program of selling mining directly to the public by means of making speakers available to schools and civic clubs throughout the State. It is amazing how little the average layman knows about the mining industry and that through open discussion many of the fears and bugaboos that now keep men from making mining their occupation can be dispelled. Service clubs have shown keen interest in these facts. In the State of Utah mines and mining claims account for approximately one-sixth of the total assessed valuation. The mining industry supplies directly or indirectly a livelihood for 47 percent of the people of Utah. This situation is not too different in several other Western States. Wages within the mining industry are among the highest paid in any industry. Through industrial medical services together with employe medical and hospitalization plans, to which most mining and smelting companies contribute generously, the employe in the mining industry has his health needs attended to at a negligible cost to him. Employes participate in low-cost insurance. Holiday and vacation privileges are equal to, if not better than, other comparable units of industry anywhere. Mining companies are concerned with the welfare of their employes and are continuously contributing to the health and welfare of the men engaged in mining occupations.

Last spring the U. S. S. R. M. Co. recruited from representative colleges and universities 57 students to work in the mines. Late in the summer, under vice-president and general manager Fred Mulock's direction, these men were conducted through the mill and smelter and given a dinner. At this dinner the company staff learned a lot about their operation from these young men, and more important, these young men have viewed at first hand some of the problems that will later confront them in mine operations and have gained new ideas concerning their future studies. In part, by such means and through their scholarship program, the U. S. Co. hopes to keep employed young technical men who with sufficient experience and training may later engineer, supervise, and manage the operations. Of course, non-technical men are now and will always play a major role in supervision.

Tax—Traffic—Nonmetallic Minerals

HENRY B. FERNALD and LOUIS WARE, Session Chairmen

The General Outlook for Taxes

By **Ellsworth C. Alvord,** Tax Counsel American Mining Congress

A FEDERAL budget was forecast for the fiscal year 1950 totalling $45 billion but doubt was expressed that Congress would authorize such a sum. Mining men are urged not to permit Congress to allow such an expenditure total.

The budget for 1950 was projected as follows: National Defense Program, at least $15 billion; foreign aid program, $7.2 billion; veterans, $6.5 billion; interest on the public debt, $5.3 billion; tax refunds, about $2 billion, thus leaving only about $7 billion for all other governmental expenditures.

If we are going to finance a $45 billion budget without deficit financing more revenues must be found, but notwithstanding the reduction in taxes for 1948, we will collect this year and next year more than the Treasury estimated prior to the tax reduction. In other words, this year we will collect about $44 billion.

It is thought there will be no war and no depression and that there will be a continued rising national income and national production with revenues in 1950 just about equaling the presently proposed $45 billion scale of expenditures.

We cannot afford to spend that much money nor afford to raise that much money through taxation and there are two very simple reasons why our expenditures are running the way they are. Actually, we are operating in a wartime economy. Fifteen billion dollars for National Defense is more than the entire government spent in that year of hectic preparation for war. While we must be strong enough militarily to give us all the assurance possible that there will be no war, our military strength must rest upon a more fundamental strength, which is the real strength of the United States. But in addition to attempting to operate in a wartime economy, we are also attempting to operate in a peacetime economy, so that all of the expenditures which formerly would be made in a period of peacetime prosperity are heaped on top of our war requirements. We can't maintain that load. Consequently, so long as we must assure that there be no war,

E. C. Alvord

then we must postpone, reduce, or eliminate all other expenditures which are not directed toward that policy. We must attempt to keep our Treasury financially strong, solvent, and not risk the consequences of physical folly. We know what has happened to all other countries, and you see it happening here.

The serious way to fight inflation is not through controls. Washington has a habit of embarking on a policy such as spending which naturally leads to what Washington calls inflation. If there is a serious desire to fight inflation, the simplest way to begin is to curtail Government expenditures. It is the spending which controls all the factors that make up our revenues and has a direct bearing upon the taxes which the people and industry must pay.

With a reorganization and revision of our tax burden and a much more severe control over expenditures by Congress we can get our expenditures down to the point where we can have further essentially-needed tax revision as a second step toward a sound peacetime revenue program. Unless we do so we are headed for serious fiscal problems in Washington with a resulting impact upon the Nation.

No excess profits tax is anticipated next year. We already have renegotiation. Incidentally, the exemption in the Renegotiation Act for raw materials was omitted by the draftsmen of the new Act and by a very skillful operation of the Mining Congress, Julian Conover and Mr. Dickinson put it back in there in about three hours.

No increase in taxes is foreseen, but a revision of our technical administrative provisions is indicated which will make the tax laws work a little bit better. A trend toward further tax reduction is predicted, not in 1949 but in 1950, based upon the confidence that there will be control by the American people exerted over the spending policies of our government.

Technical And Administrative Amendments to The Internal Revenue Code And The Mining Industry

By **Arthur H. Kent,** Attorney
San Francisco

A NUMBER of recommendations were reviewed which the American Mining Congress has taken up with officials of the Joint Committee on Internal Revenue Taxation in Washington. These amendments fall naturally into two classes or groups, viz., those which are of importance to the industry generally, including mining; and those solely applicable to and of material importance to mining.

Under amendments of general application are revision of net operating loss deduction: (a) method of computation of loss deduction; (b) carry-over period; and (c) preferred that net loss carry-over be computed under the law applicable to the year of loss. Depreciation: The law to be changed so as to provide that the taxpayer's choice of depreciation rates should control so long as he adheres to his choice with consistency, unless the commissioner establishes that the rate selected is beyond the zone of bona fide and reasonable judgment. Taxation of Dividends: Three major changes long overdue, (a) the tax upon intercorporate dividends should be repealed; (b) the penalty tax on consolidated returns should be repealed; and (c) as a practical measure to create incentive and investment of risk capital and as a step to ameliorate the present multiple taxation of corporate profits, dividends received by individuals should be relieved of the first-bracket tax rate.

Under special definitions affecting mining—Development and Preliminary Mining Expenses calling for a paragraph (D) to be added to Section 23 (a) (1) of the Internal Revenue Code as follows:

"In the case of mines and other natural deposits (except oil and gas wells), all expenditures for exploration and development (other than expenditures for depreciable property and expenditures incurred in the preliminary determination of the existence of a deposit having commercial possibilities), and expenditures for experimental or pilot plants and equipment and for research and experimentation pertaining to the application, recovery and utilization of such deposits shall not be added to capital account recoverable through depletion but shall be deductible as expenses or costs of operation, at the option of the taxpayer, either (i) in the year in which paid or incurred, or (ii) as deferred expense ratably apportioned to the production related to such exploration, development, research, and experimentation, and to the extent not previously deducted hereunder by the taxpayer, in the year in which there is no reasonable expectation of such production thereafter by the taxpayer."

"Mineral property" to be defined in the law by adding at the end of Section 114 (b) (4):

"(—) Definition of Property—For the purposes of this paragraph and Section 735 the taxpayer shall have the option either (A) to treat each separate mineral interest as a separate property, or (B) to treat as such property any part of a separate mineral interest or any combination of separate mineral interests or parts thereof which normally or reasonably may constitute an operating unit or project and is so treated by the taxpayer, whether such mineral interests or parts thereof are included in a single tract or parcel of land or within two or more contiguous or noncontiguous tracts or parcels. As used in the preceding sentence, the term "mineral interest" means each separately acquired interest in a single deposit of minerals, or, if such deposit is included in more than one tract or parcel of land, the portion thereof in each."

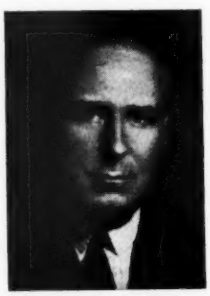
In the matter of transportation of ore from mine to mill in computing percentage depletion an insertion was advocated after the end of the third sentence in Section 114 (b) (4) (B), a new sentence:

"The term 'mining,' as used herein, shall also be considered to include the transportation of the ores or minerals (whether or not by common carrier) from the point of extraction from the ground to the plant or mill in which the ordinary treatment processes are applied thereto, provided that the location of such plant or mill is at a point which is not substantially more distant from the point of extraction than is reasonably necessary for efficient and economical operation."

Considering "Net Income from the Property" for purposes of percentage depletion, it was stated that administrative practices within the Bureau have gradually developed to reduce the amount below that which under earlier practices was considered allowable. The courts have generally tended to support administrative determinations where the law is not definite in prescribing its basis. To make clear the intent of Congress and to give the taxpayer protection, a definition was proposed to simplify the computations and limit the deductions to those items which have a direct bearing upon the production of income from the particular property on which the percentage depletion is allowable. Such an amendment, as an expression of congressional intent, should be given retroactive effect.

In conclusion a call was made for repeal of the tax upon freight which bears so heavily upon the mining industry; a clear cut and specific definition of a metal mine to provide that the entire production be classified according to the status of the major product; and for correction of the situation in the Chicago Mines Co. case in which depletion was denied on recoveries from a tailings or waste dump unless "created with the accompanying intent to work it at a future time."

Revision of Tax Levies and Methods are Needed to Encourage Mine Exploration and Development



By **Stanly A. Easton,** President
Bunker Hill & Sullivan Mining And
Concentrating Co.

THE discovery of new mines and the finding of new ore bodies in old mines requires sustained effort and money. With the passing years, dependence for success must be placed on the new prospecting, which is an association of engineering skills and a lot of money, all backed up by a healthy, experienced optimism. There must be government help in bringing forth metal production, through research, surveys, and statistical data in which the U. S. Bureau of Mines and the U. S. Geological Survey are contributing in increasing measure; and financial help to the industry through adjustments in the tax laws and the methods of their application. In this regard there should be acceptance of the recommendations of the American Mining Congress Tax Committee as presented by Arthur Kent.

The first years are the most difficult for any new mining enterprise. In a large part the first earnings must be used for strengthening the position of the infant undertaking, with little or no return for the owners, but the Government must have its tax, regardless.

Urged particularly was a five-year carry-forward and a two-year carry-back of net operating loss. Attention was then devoted to the levying of income taxes more than once on the same earnings with the assertion that in mining, particularly, this unfairness is probably more frequent and more serious than with other corporations. It often happens that because of diversity of ownership and very small outstanding interests it becomes necessary for the parent company to create practically wholly-owned affiliated companies to take care of such situations, although physically the two or more operations may be conducted as a single unit, all under the same management, and the same board of directors. Earnings of the affiliated companies after initial taxing are again taxed when paid into the treasury of the parent company; disbursements to the owning stockholders are taxed again, and the individual taxpayer pays his income taxes, so that in actual instances it has been known that the owner receives as little as 10 percent of the original earnings of these affiliates.

Also deplored were the instability and uncertainty of income tax payments after the miner has done the best he can to make an accurate and fair return of his business. It was explained that months afterward this return may be censured by U. S. Treasury representatives, often with respect to the validity of certain deductions or other alleged errors, requiring an interminable amount of research long after books have been closed, with the honest belief that all was satisfactorily disposed of. This results in calling executives and staff from operation and production to the reviewing of matters which were deemed to be efficiently disposed of long ago. The amounts involved are often all out of proportion to the efforts, expense, and time required for their disposition. Through the years of its operations, the mining industry will pay its tax without complaint if assessed with accurate relationship to its real earnings. When so done, tax returns of the government can be made with less cost of collection, and in the aggregate in larger amounts, not only to the financial advantage of the government, but to the relief and a greater peace of mind of the mining taxpayer and the investor.

Removing Tax Deterrents to Mining Investment, Exploration and Development

By **H. C. Jackson,** Partner
Pickands Mather & Co.

A MAJOR portion of the iron ore industry in the Lake Superior District is facing a transition from the mining of open-pit ore of direct-shipping quality to the quarrying of low grade iron-bearing materials and the complicated processing of these materials, known as taconite, into a high grade shipping product. This change-over would probably take from 15 to 20 years, during which period "there will be extraordinary demand for risk capital to finance experimental work and the erection of experimental plants of commercial size."

The situation in the Lake Superior iron ore industry, as in other industries with major experimental programs, requires that, in computing taxable income either for State or Federal purposes, the industry has a free hand in writing off its experimental costs and investments. In this connection full endorsement was given to the proposed amendment of Section 23 (a) (1) as presented by the American Mining Congress (see Arthur Kent above), which would go a long way to provide the mining industry the deductions to which it is entitled for expenditures for exploration and development, and expenditures for experimentation and experimental plants, and to permit the extinguishment of capitalized development in addition to, and not out of, percentage depletion.

The allowance for depreciation of capital investments in plant and equipment should be revised in the Federal Code. If it is felt some control should be exercised by the government during the transition period to an unrestricted depreciation deduction, then the taxpayer, at his election, should be entitled to write off up to 50 percent of depreciable property in the year of expenditure or spread over a period of not more than five years.

Another major item which is vital to the mining industry is the treatment of percentage depletion in computing net-operating-loss deduction for prior years. The effect of the present method is to cancel out the allowance of percentage depletion both for the year of loss and the year to which the loss is carried as a deduction. This should be corrected retroactively so that percentage depletion is fully allowable under such conditions.

Removing Tax Deterrents to Mining Investment, Exploration and Development

By **Harvey S. Mudd,** President
Cyprus Mines Corp.

IN small mining properties, ownership may be sole and direct, or partial through a legal form such as a partnership, association, or corporation. A corporation is as an artificial person, the legal instrument through which individuals associate themselves together, but that the ownership of the property held really rests in the shareholders. These shareholders should be entitled to at least some of the deductions allowed the members of a partnership in computing taxable income. The corporate form offers certain advantages, such as limited liability, but it deprives the proprietors of valuable benefits and leads to double taxation as our laws are now framed.

Our tax laws place the shareholder in a much more unfavorable position than the member of a partnership, especially as regards the early recovery of his capital. The corporate form of proprietorship is penalized and this handicaps the investor of modest means and the man who is legitimately seeking to promote a mining enterprise. Most newly-developed ore deposits will return little profit to the proprietors, for they must first recover their capital and only after that has been accomplished will there be any real profit. Thereafter distribution of earnings must be two, three, or even four-fold the capital expended before the individual has his investment back, because of the taxes he is required to pay. An individual or a group acquire a good mine and expect to do handsomely in it, but when the final outcome is known, they find to their amazement and consternation that they have not done much better than to recover their capital plus a modest gain which is not at all commensurate with the risk they have taken.

Canada has pursued an enlightened policy of granting depletion as a percentage of net profits and in addition, its Income War Tax Act provided that certain mines, including all metal mines, are free from income taxes for three years after coming into production. Mexico grants import tax concessions to new mines for a period of five years; South Africa has adopted the principle of accelerated write-off of capital expenditures at new gold mines; and to encourage investment in its declining gold mining industry, Australia has offered almost fantastic inducements which are too involved to permit of brief description.

The mining industry should seek accelerated depreciation on new plant and improvements, and secondly, mining enterprises based on newly-discovered ore deposits or upon mines that have long been idle should be given freedom from income taxes for a short term of years after production begins. These measures will enable the proprietor to recover his investment in a shorter time even though he must pay individual taxes on a higher income. Thus the search for new mineral resources will be stimulated and the chances are that some of the enterprises that start off on a modest scale will develop into important producers.

The Mining Industry's Position in Traffic and Transportation

By **O. W. Tuckwood**
General Traffic Manager,
American Smelting and Refining Co.

THE mining industry, by the very nature of its production, is still dependent upon the various "for hire" forms of transportation—particularly the railroads.

The importance of the mining industry to the railroads of this country is graphically illustrated by the fact that the products of mines required the loading of over 15,000,000 cars containing approximately 848,000,000 tons of material during the year 1947. This represented 41 percent of the total of all carload freight loaded in that year, and the tonnage represented 56 percent of the entire tonnage reported for all commodities shipped in carload quantities. Of course, the tonnage of coal and coke accounted for approximately 543,000,000 tons, or 64 percent of the total shipments of products of mines as classified by the Interstate Commerce Commission. The average load per car for all products of mines was approximately 56 tons, as against an average of slightly over 34½ tons per car for products of agriculture and but slightly over 14 tons per car for animals and products thereof. Products of forests averaged slightly over 34 tons per car and the other major classification, manufacturers and miscellaneous, reflected an average of but 30½ tons per car. I want to carry this comparison a little further because, as I analyzed these figures, I became more and more impressed with respect to your vital importance to the railroads of this country. In looking over the commodities grouped under the major classification of manufactures and miscellaneous, I found that a total of almost 6,000,000 carloads containing approximately 213,000,000 tons consisted of commodities produced exclusively from products of your mines, such as iron and steel, nonferrous metals, etc., so if that tonnage alone was added to the production of your mines your industry accounts for 57 percent of the total number of carloads and 70 percent of the total tonnage transported by the Class I railroads. This, of course, does not include the heavy volume of inbound movements to mills, mines, smelters, and refineries, such as mine props, grinding balls, machinery, etc. All in all, I would hazard the guess that the mining industry, either directly or indirectly, accounts for about 80 percent of the total tonnage handled by the Class I railroads. I have made no detailed analysis of the freight revenue figures, but of the total of over $6 billion revenue collected by the Class I railroads in the year 1947, a very handsome share came from the products that you use and that you produce.

The industry has already been substantially affected by freight rate advances since 1945 and the railroads are likely to petition for further rate advances as a result of their latest wage negotiations. A study of statistics reveals that trucks

are already handling almost one-fifth of the Class I railroad tonnage and nearly 85 percent of all less-than-carload tonnage. This trend makes me wonder how much longer the railroads can maintain their preeminent position in mass transportation.

The industry is being grossly discriminated against in rail rates, notably in connection with the movement of nonferrous ores and concentrates on the basis of graded actual valuation rates. Important rail traffic officials have promised to help rectify this situation.

The importance of transit privileges which permit processing en route is of great importance, and the industry is urged to guard transit jealously to prevent abuses which would jeopardize it. The mining industry as well as the transit-granting railroads must stand ready to defend such transit arrangements should they be attacked, as each benefits equally therefrom to the extent that it makes possible tonnages that otherwise in most instances would not materialize.

The necessity for properly classifying and billing rail shipments to prevent Federal criminal action was outlined and shippers urged to have a reasonable defense for any bill of lading description used.

The future will show much more diversion of mineral production from rail to truck. As to water transportation, it remains the cheapest form of commodity freighting. Citing the tremendous freight-rate increases that have taken place in recent years on ocean liner services, it may be emphasized that most of these liner operators are banded together into trade-route conferences with but few independent or nonconference operators existing. Most of these conferences issue to shippers so-called exclusive patronage contracts which obligate the shipper to move all tonnage via the conference lines or otherwise pay a penalty rate, which is usually about $3.00 per ton above the contract rate. This exclusive patronage contract is believed to be illegal and it is under attack by the Department of Justice and may be headed for decision by the U. S. Supreme Court.

Nonmetallic Minerals of the West

By **Henry Mulryan**

Executive Vice-President & Gen. Manager
Sierra Talc & Clay Co.

NONMETALLIC minerals, or industrial minerals, have attained great importance in the West. Large industries have come to this area because of important deposits of natural materials, sources of cheap hydroelectric power, natural gas, petroleum, and a relatively mild climate.

The old-timers in the industry are cement, sand and gravel, salines, gypsum, limestone, barite, magnesia, asbestos, silica sand, feldspar, talc, diatomite, refractory, and red burning clays. Newcomers are vermiculite, pumice, perlite, asbestos-silica-cement compounds, battery-box fillers, pyrophyllite insecticide carriers, and bleaching clays for the vegetable and animal oil industry.

The cement industry is generally located close to large industrial areas. Sources of large deposits of limestone must be near cheap transportation, either rail or truck. The glass container industry is dependent upon cheap sources of relatively pure silica sand. Deposits of silica sand are located near San Francisco at Del Monte, near Los Angeles at Corona, but the bulk of the sand is shipped in from Nevada near Las Vegas.

The ceramic industry is of great importance on the west coast. Sources of clays suitable for red-burning products such as sewer pipe, drain tile, paving tile and shingles are common and near producing centers. The Los Angeles area is an important producer of ceramic tile for wall and bathrooms. The major constituent of such tile is talc. Fortunately for the industry, in Southern California large deposits of talc suitable for this purpose are found in the Death Valley region. Without these deposits, it would be likely that inferior tile would still be produced from clay, feldspar, and silica.

The chemical industry is keeping pace with the rapid development of the West. The Pacific Coast Borax Co. at Boron is the world's largest producer of borax. There a great underground mine produces kernite and tincal to furnish the bulk of the world's demand for borax.

Soda-ash is produced from saline solutions at Owens Lake by three companies and at Searles Lake by two companies. The demand for soda-ash is so great that deposits are being considered in Idaho and Wyoming. These deposits were discovered by deep well drilling and would require deep shaft mining if the soda could not be dissolved and pumped to the surface.

Chemical salts for fertilizers are produced in Utah and Idaho. Recent work by Westvaco Chemical Co. has resulted in the erection of a plant in Idaho to produce elemental phosphorus and phosphate fertilizers.

Magnesia salts are produced in the San Francisco area from salines and at Moss Landing on the Pacific Ocean. Some magnesite is mined in Alameda County, Calif., for this purpose. Refractory magnesite is mined near Chewelah, Wash., and refractory brucite and magnesite in Gabbs Valley, Nev.—recent source of ore for magnesium metal production near Las Vegas.

The paint industry is one of growing importance on the Pacific coast. The nonmetallic minerals used as extenders are chiefly whiting and talc. A new plant for small micron size whiting has been built at Victorville—producing fine and coarse mesh whiting from remarkably pure recrystallized limestone.

Deposits of talc in Death Valley furnish the requirements for the west coast. These talcs are so satisfactory for paint formulation that they are now competing with the previously well-established eastern talcs in the middle west and even the east coast.

A new western development is the manufacture, by heating of perlite, of a variety of obsidian or volcanic glass. New uses are occurring daily—but the chief uses will no doubt be in light-weight concrete and insulating plaster or insulating fillers.

Other minerals are gypsum from the desert areas of California and Nevada; barite chiefly used in oil well drilling—deposits occurring in every western state; asbestos, which only occurs importantly in the West in Arizona, although some deposits are worked intermittently along the entire Pacific Coast.

"The nonmetallic industry is not so much mining as it is a combination of mining, processing, and selling. Those factors that have a direct bearing on the economic importance of a deposit are: size of deposit; type of mining required; location as to highway or rail transportation; and location as to use of material.

Adding to Ore Reserves

IRA B. JORALEMON, Session Chairman

Results of Recent Exploration And Development in Adding to Ore Reserves in The Northwest

By **Carlton D. Hulin**

Consulting Geologist and Professor of Geology, University of California

Carlton D. Hulin

IN the Coeur d'Alene region of northern Idaho, exploration carried on at evelations at and below sea level, and at depths ranging from 4000 to 5000 ft below the present surface, has resulted in substantial additions to the ore reserves and to the future life of the Coeur d'Alene district. The Bunker Hill & Sullivan Mining & Concentrating Co. plans to mine a large body of low grade ore by block-caving. Increased activity is manifest in various districts in central and southern Idaho. Work being accomplished in the Metaline District in Pend Oreille County suggests that a major producing district may here be in the making.

In California, renewed interest in the Shasta County copper belt is made evident by a detailed study of the district now in progress. Results of rehabilitation and development carried on at the Afterthought Mine have been sufficiently successful that early production from this property is anticipated. The plight of the gold mines is in marked contrast to the quickened interest evident in base metal mining.

Early this year the announcement was

made that stockholders of the Argonaut Mine had voted liquidation, profitable operation being regarded as impossible under present conditions. The Idaho Maryland continues as the foremost lode gold producer of California, the announced production for the past year amounting to some $2,000,000. Limited production is being maintained from the Empire-Star on the basis of leasing. Early production from the Central Eureka is planned, the mine having been rehabilitated and reopened to the 3700 level.

Quicksilver mining, like gold, is in a sad plight, the result of inadequate tariff protection. With mine after mine suspending operations over the last year or more, the debacle appears to have been completed with the recent reduction in price of $76 per flask announced by the Spanish-Italian cartel. The Sonoma quicksilver mine remains in operation and the Bonanza Mine in Oregon continues in production with half-time furnace operation.

The Yellow Pine Mine at Stibnite is producing antimony ore at the rate of 2000 tons per day from the only open-pit mine operating in Idaho. Development of ore has been sufficiently favorable to justify the building of an antimony smelter, construction of which was started during the past summer.

Among the newer mining operations involving rare metals is the Blackbird Mine, a cobalt-copper deposit being developed by the Howe Sound Mining Co. in eastern Idaho.

Production has been suspended at the Ima Mine pending completion of the new mill scheduled for November of this year. Reopening of the Germania Tungsten Mine in Washington has recently been announced.

The cessation of shipments of monazite from Travancore in southern India has created a shortage of this mineral in the American market, with resultant increased interest being shown in the occurrences of monazite long known to exist in Idaho. Two new discoveries of uranium have recently been reported from the Northwest. One of these centers in the Bridge River District of British Columbia where uranium has been found in an uncommon association with cobalt. The other discovery is in the John Day region of central Oregon where the occurrence of uranium in a vein 70 ft wide appears authenticated.

In the nonmetallic field, magnesite in Washington and British Columbia, gypsum in Idaho, and perlite for the manufacture of light weight aggregate in widely distributed deposits, are only a few of the items which should be mentioned. The largest phosphate reserves in the United States occur in Idaho where 5,000,000,000 tons of high grade phosphate rock are estimated as being available. Three large operations are producing phosphate rock in Idaho at this time, and plans are under way for the early construction of a large plant which will produce elemental phosphorus from the crude phosphate rock.

Adding to Ore Reserves in Arizona And Southern California

By **E. N. Pennebaker**
Consulting Geologist

IF we consider an area of about 25 miles radius, centered a little to the north of the smelter at Hayden, Ariz., and if we include tons of ore in reserve plus tons of ore mined out, we obtain a figure of around 900,000,000 tons for the total resources, past and present, of the area that includes Miami, Inspiration, Ray, Magma, Globe, Castle Dome, Copper Cities, and San Manuel. As a source of copper ores, this area is only exceeded or seriously rivalled by a few other mining regions of the world. Yet about one-half of this tonnage of ore has been discovered since 1943. There are reasonable expectations for other important discoveries of copper ore in the southwestern United States. In addition to the discovery of some 460,000,000 tons of low grade copper ore at San Manuel, the Miami Copper Co. has authenticated the existence of a substantial body of low grade copper ore by recent drilling its Copper Cities area. An increase of several million tons to the Castle Dome ore body also resulted from postwar exploration. Smaller, but nevertheless important bodies of higher grade copper ore have been developed by the Coronado Copper & Zinc Co. at its Republic and Mammoth mines near Johnson Camp, Ariz., and by U. S. Bureau of Mines drilling at Christmas, Ariz.

Ore reserves are being maintained by a number of mines to support an augmented zinc and lead industry. The most important production is at Bisbee where about 1,000,000 tons have been mined during the past 5½ years at a grade of 16 percent Zn and 6 percent Pb.

Another instructive example of postwar development of Zn-Pb ore is at Shattuck-Denn's Iron King mine in Yavapai County, Ariz. In 1947, 295,000 tons were discovered in comparison to 123,000 tons mined. Mammoth-St. Anthony, Ltd., in Pinal County, a substantial producer of zinc and lead, is much encouraged by a worthwhile discovery to the north of its principal mining area. Zinc reserves are being maintained at the Republic and Mammoth mines of the Coronado Copper & Zinc Co. and at Eagle-Picher's San Xavier mine near Tucson.

Mining operations that have developed Pb-Zn ore bodies that permit substantial production are Shattuck-Denn's Abril mine near Tombstone, Ariz.; the property of the Athletic Mining Co. at Klondyke, Graham County, Ariz.; the Darwin mines group and the Shoshone division operated by Anaconda in Inyo County, Calif. Discoveries are also reported from the Ruth mine near Prescott and the Tennessee mine near Chloride, Ariz.

In the eastern part of the Eagle Mountains, Riverside County, Calif., some 43,000,000 long tons of iron ore were outlined. The Vulcan iron ore deposit in San Bernardino County was also determined to contain 5,666,000 tons. Encouraging exploration results are rumored from the Pine Creek tungsten area near Bishop, and the Surcease Mining Co. is confident of outlining additional placer tungsten reserves given favorable market conditions. We have had recent reports of uranium discoveries in northern Arizona as well as in San Bernardino County, Calif.

Recently initiated open-pit operations at Ray, Inspiration, and Bagdad will increase the reserves of disseminated copper ores in these producing areas, thus permitting a longer life to operations and a continuing opportunity to find new ore elsewhere on their properties. From such a group of 171 properties in a region so abuntantly mineralized as Arizona, we can confidently expect a number of substantial discoveries. Exploration projects are being carried on by A. S. & R. Co. at Silver Bell, Pima County, Ariz.; by Kennecott Copper Corp. at Schneider Hill in Gila County, Ariz.; by the Amico Mining Corp. along the trend of the Miami and Old Dominion mineralized zones; by Miami Copper's deep drilling campaign now going on in the Copper Cities area; and by Phelps-Dodge's continued efforts at United Verde.

Results of Recent Exploration And Development in Adding to Ore Reserves in Intermountain States

By **R. N. Hunt**, Chief Geologist
U. S. Smelting, Refining & Mining Co.

THE nature of developments should highlight in the intermountain states of Montana, Nevada, Utah, Colorado and New Mexico the fact that the nonferrous mining industry in the West is no longer in its youth and on the ascendent. Given an adequate metal market we will do well to hold our own.

The outstanding developments in Montana are at Butte where preparations are underway to exploit by block caving 150,000,000 tons of ore of a grade of approximately 1 percent copper. Seven or eight phosphate mines in Powell and Granite counties contribute to the increasing importance of the fertilizer business in the West.

Vigorous development of the Zn-Pb-Ag ores of the Pioche district by Combined Metals Reduction Co. under the management of Ed Snyder; and in the adjoining Ely Valley mine, continues. The Eureka Corp. has persevered in the development of a down-faulted segment of a rich block of dolomite in the old Richmond-Eureka mine. At the Getchell mine drilling followed by underground development justifies enlargement of the mill to 1500 tons. Finally, in Nevada, should be noted the drilling of at least 50,000,000 tons of 1 percent copper ore at Yerington.

The outstanding development in Utah, is the accelerated exploration of the iron ores of the southwest portion of the state. Iron ore is now being mined at the rate of about 3,500,000 tons a year. In the nonferrous districts, Kennecott's capital investment in a new railroad connecting mine and mills, deeper railroad tunnels to the Utah Copper pit and arrangements with its neighbors whereby to expand the perimeter of the pit, will make available in future years reserves in the lower reaches of the Utah Copper ore body.

In the extensive holdings of the United States Smelting Co. in Bingham, major developments are underway which will eventually explore in depth and laterally large virgin areas in the district. New Park developments have inspired Newmont and associates to undertake prospecting jobs on the eastern side of the district—speculative activity of a type of which there is too little in the West at the present time. In the Tintic district Chief Consolidated, International Smelting Co., Newmont, E. J. Longyear Co., and others have been active in exploration reaching down and out into new ground.

In Colorado, Newmont's Idarado operation, above Ouray, extended the Treasury tunnel and opened a generous strike length of complex ore. Telluride Mines, Inc., has developed upwards of 3500 ft of ore some 400 ft below Tomboy stoping. Commercial values have been demonstrated in at least two segments of the old Smuggler vein in the conglomerates and Permian red sandstones underlying the Tertiary volcanics.

Newmont, the Hecla Mining Co., and the United States Smelting Co. have, in the Resurrection Mining Co., for ten years been partners in an attempt to rejuvenate the old Leadville district. Since 1941 Resurrection has maintained production of 300-400 tons daily and exploration activities are being pushed as rapidly as possible.

In the old Kokomo district the A. S. & R. Co. is exploiting Au-Ag-Pb-Zn ore in shallow surface work. Development work has added some 150,000,000 tons at depth to Climax molybdenum ore

reserves. The Rico Argentine Mining Co. has built a paying operation in the old district of Rico.

Nine years ago the Peru Mining Co. and the United States Smelting Co. determined to investigate the possibility of further development and extension of the productive area in the Central City district of Grant County. Continued production from the Hanover mine of Empire Zinc, the Ground Hog mine of A. S. & R. Co., and these newer operations, raised the Central City district in recent years (1943-44-45) to third place among western zinc-producing districts.

Drilling and underground work has successfully extended Kennecott's Chino open-pit copper ores into an area now being rapidly stripped. Kennecott has developed important reserves of zinc ore now being hoisted through its Oswaldo shaft. New Jersey Zinc, with E. J. Longyear & Co. as partner, is responsible for a commendable effort in the Organ district east of Las Cruces, N. M.

On the negative side, lead production during the recent war years failed to reach the peak of World War I, in part due to the closing down of such mines as the Highland Boy and Utah Apex mines at Bingham, the Hecla, Hercules and Inter-State Callahan mines in the Coeur d'Alenes, and to the decline in production of the Tintic Standard and Chief Consolidated mines in the Tintic district, and the Park Utah mine in Park City. Adequate reserves have not yet been found in the West of sufficient magnitude to replace the yield of these mines.

The St. Louis Smelting and Refining Co. has continued to increase their production rate and have also been active in drilling their holdings in this area. More attention is being given to the development of upper ore horizons in the Boone series. An exploration program of possible future significance in this general area, is the initiating of exploratory drilling by Anaconda on acreage in Eastern Kansas in the Pittsburg vicinity.

In zinc, the program of the New Jersey Zinc Co. at Friedensville, Pa., and the success of the Calumet & Hecla and the Eagle-Picher companies, in drilling out what appear to be substantial new reserves in the Wisconsin-Illinois field, are of interest. The first success was had by the Tri-State Zinc Co., who drilled out a substantial ore body on the Heer and adjoining tracts, and two years ago completed a 600-ton concentrator, now in successful operation. Calumet & Hecla have been most active near Shulsberg, Wis. Shaft sinking is at present under way, and announcement has been made that a 600-ton concentrator will be built at this location.

With the single exception of the Tri-State district, given a continuation of attractive metal prices and freedom from labor difficulties, there is every expectation that the major mining areas of the Mississippi Valley and Eastern States can maintain current production rates for some years to come.

In Mr. Cameron's absence, this paper was presented by Rene Mechin, Manager, Edwards Division, St. Joseph Lead Co.

Results in Recent Exploration And Development in Adding to The Reserves in The Mississippi Valley And Eastern States

By **Francis Cameron,** Vice-President
St. Joseph Lead Co.

MINES of the Mississippi Valley and Eastern States in 1947 accounted for the production of 4.3 percent of the total newly-mined copper; 43.0 percent of the newly mined lead; and 46.5 percent of the newly-mined zinc. As with Western mines, exploration and development since the war has proceeded at an accelerated rate. With one or two exceptions, the major producing districts have increased rather than depleted reserves of known ore.

In copper the most interesting development has been the work of the Copper Range Co. at their White Pine property in northern Michigan. Preliminary estimates released by the company indicate around 200,000,000 tons of developed and probable ore, having a grade of 1.1 percent copper and 0.2 oz silver per ton, with the ultimate lateral and depth limits of ore mineralization not yet determined. Calumet and Hecla have likewise been active in exploration and are continuing development of the Kearsarge Amygaloid ore body. In the Ducktown area in Tennessee, operations appear to be continuing about as in the past; and in Vermont, the Vermont Copper Co. is continuing production from the Elizabeth mine.

In lead there have been no new or startling developments. The St. Joseph Lead Co. has also reopened properties at Doe Run, Mo., which have been closed since before the World War I, and is continuing active exploratory drilling of its Southeast Missouri holdings. In the Fredericktown area, the Mine La Motte Corp. has opened the Hickory Nut property.

Western Hemisphere Iron Ore

By **Franklin G. Pardee,** Appraiser of Mines
Michigan Geological Survey

THE impact of World War II and the postwar demands for steel products have focused the attention of the iron and steel industry on the iron ore reserves in the Western Hemisphere. Iron ore areas outside the United States are being examined as possible sources of supply for the furnaces of this country.

The Algoma region of Canada, through the efforts of the Algoma Steel Co., is contributing to our requirements in the form of sintered siderite. The Jones & Laughlin Co. has been drilling siderite deposits in this area. Also, the Algoma Steel Co. is reported to hold substantial reserves of magnetite ore that requires concentration. Steep Rock Iron Mines, in the Atikokan region, is contributing tonnage to our furnaces.

The most important development in Canada has been along the Quebec-Newfoundland boundary in the Labrador region. Six companies hold concessions in this area. The Hollinger North Shore Exploration Co. has a concession on the Quebec side of the boundary and the Labrador Mining and Exploration Co. is operating in the Newfoundland portion of this region. Over 100,000,000 tons of high-grade ore have been developed and that the goal of 300,000,000 tons appears to be in sight for 1948.

The U. S. Steel Corp. and Bethlehem Steel Corp. have continued exploration and development programs in Venezuela and activity is reported in Brazil. On the west coast of South America the Bethlehem Steel Corp. has continued to receive ore from Chile and the Peruvian government is currently studying the possibility of the use of their Marcona deposits for a blast furnace and a steel mill in northern Peru.

In the search for new deposits in the Lake Superior region, it is hoped that substantial additions will be made to reserves. In New York the Republic Steel Corp. has undertaken an extensive diamond drilling campaign to explore an old mining area near Antwerp, N. Y. Exploration by government agencies and private companies has been carried on in the Birmingham District, Utah, Missouri, California, Texas, New Jersey, and other areas.

Laboratories to study methods and processes of the beneficiation of low grade ore have been established by the U. S. Steel Corp. at Duluth, Minn., by Butler Brothers; Pickands Mather & Co.; Mesabi-Cliffs Co., and M. A. Hanna Co. on the Mesabi Range, and by Jones & Laughlin Steel Co. at Negaunee. Ground has been broken for a laboratory for the Cleveland-Cliffs Iron Co. at Ishpeming, Mich. Research work is being pushed on the treatment of magnetic taconites by fine grinding and magnetic concentration. Oil flotation, is being investigated in research programs on hematite formations of taconite and jasper. The pilot plant of the Erie Mining Co. treating magnetic taconite, near Biwabik, Minn., has recently been put into operation. The Reserve Mining Co. is preparing to mine and beneficiate the low grade magnetic taconite from Babbitt, Minn., at the east end of the Mesabi Range.

New types of percussion drills and bits for drilling the hard taconite and jasper formation are being tested. A solution of the drilling, crushing, and grinding problems of the siliceous iron formation will do much to hasten production of concentrates from taconite and jasper to add to the reserves of iron ore in this country.

Several Heavy-Media type plants have been built on the Mesabi Range, as well as a new installation at the Russelville Brown Ore mine in the Birmingham District. A pilot plant is being constructed at the Benson Mine in New York to further test the recovery of the nonmagnetic ore associated with the deposit.

Continued expansion of truck haulage and movement of ore by belt conveyors have released tonnages that otherwise would have been difficult to extract economically. Belt haulage of ore is also taking its place underground.

The tremendous investment in blast furnaces and steel plants, especially those dependent on Lake Superior ore, makes it essential that reserves be expanded and it is also essential that these reserves be free from the whims and fancies of any foreign government in time of emergency. Underground ore and open-pit concentrates from low grade ore and iron formation must eventually replace the dwindling reserve of low-cost open-pit merchantable ores.

The greatest asset of the iron ore and steel industry is its personnel, whose engineering ability and energy has put the industry in the prominent position it now holds and it is safe to say that ways and means will be found, regardless of the effort required, to keep our furnaces supplied with ore.

In Mr. Pardee's absence, this paper was presented by Grover J. Holt, Chief Engineer, Cleveland-Cliffs Iron Co.

Services of The California State Division of Mines

By **Olaf P. Jenkins**, Chief
California Division of Mines

THE California State Division of Mines, as a division of the State's Department of Natural Resources, finds its duties clearly stated in the Public Resources Code. The Division is a "bureau of information concerning the mineral industry of the State." Its representatives may at any time enter or examine any and all mines, quarries, wells, mills, reduction works, refining works, or other mineral properties or working plants in this state in order to gather data and "collect statistics concerning the occurrence and production of the economically important minerals and the methods pursued in making their valuable constituents available for commercial use."

Provision for making information available includes maintenance of a technical library "bearing upon the mineral industries, the sciences of mineralogy and geology, and the arts of mining and metallurgy;" a collection of typical geological and mineralogical specimens, models, drawings, and description of the mechanical appliances used in mining and metallurgical processes; and issuance from time to time of publications "concerning the statistics and technology of the mineral industries" of the state.

The Division of Mines has also to take into consideration the requirements of the present day, the ever-changing economic conditions, the expanding circle of public audience, the advances in scientific technique, the new utilization of minerals discovered by industry, and the work of other agencies which may duplicate or supplement the program required by the state. The Division of Mines has found it necessary first, to analyze the subjects of study in the development of the mineral industry; second, to determine the cooperation it may receive from other agencies; third, to establish an effective organization within itself which may lay a firm foundation upon which a structure may be built capable of giving authoritative aid to industry for all time to come.

The Division of Mines stimulates research workers to work objectively and conclusively. A 50-50 cooperative program has for over two years been in operation with the Federal Geological Survey to investigate and map important mineral belts, such as the Shasta mineral belt, the Mother Lode, the Darwin-Cerro Gordo-Ubehebe district, the Bishop tungsten area, and the pegmatite areas in San Diego.

In addition, the Division of Mines has published a large number of local reports prepared by the Survey, on many mineral commodities. Three kinds of publications constitute a permanent service to the mineral industry: Bulletins which are occasional monographs on special subjects; *California Journal of Mines and Geology*, a regular quarterly publication; and *Mineral Information Service*, a monthly pamphlet designed to inform the public of discoveries, operations, markets, statistics, and new publications.

Atomic Energy And The Mining Business—An Invitation

By **John K. Gustafson**
Director, Division of Raw Materials
U. S. Atomic Energy Commission

THE U. S. Atomic Energy Commission firmly believes that the discovery, development, and production of uranium ores can best be accomplished by competitive private enterprise under the stimulus of profits. Atomic energy will continue in ever increasing measure to play a part in our lives and the lives of our descendants. We want American miners to find and produce uranium in this country.

Except on the Colorado Plateau, private industry in this country was, until recently, inhibited from working or developing uranium ores. On April 11 of this year, however, the Commission announced a three-point program to stimulate the discovery and production of domestic uranium by private competitive enterprise. The major elements of this program are:

(1) Government guaranteed 10-year minimum prices of $3.50 per lb. of contained U_3O_8 for small lots of domestic refined uranium, and of $3.50 per lb of recoverable U_3O_8 less refining costs for small lots of ore or mechanical concentrates assaying at least 10 percent U_3O_8, both prices fob shipping point.

(2) A bonus of $10,000 for the discovery of a new deposit and production therefrom of the first 20 tons of uranium ore or mechanically-produced concentrates assaying 20 percent or more U_3O_8.

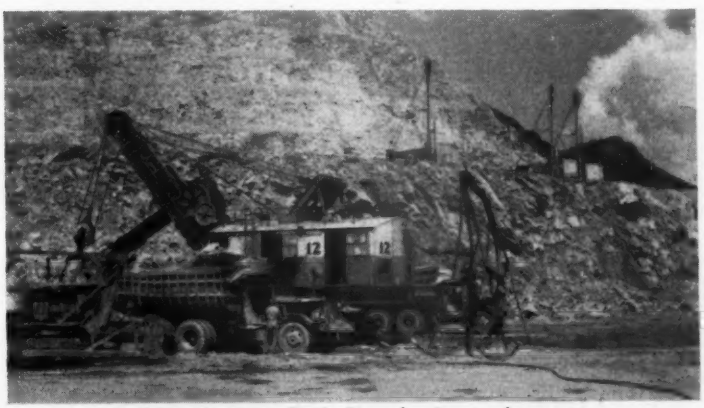
(3) Government-guaranteed 3-year minimum prices for the low-grade carnotite and roscoelite-type, uranium-vanadium ores of the Colorado Plateau area and Government operation of two vanadium-uranium plants in that area.

Where larger quantities are involved than the small lots for which this price was established, or under special circumstances, we are prepared by negotiation to establish milling and refining costs, transportation costs, and other applicable factors.

Here are some of the rules of the game and procedures: (1) uranium in deposits on the public lands, and other lands owned by the United States, is now reserved to the United States. However, the Commission's guaranteed minimum prices have been made applicable to deliveries to it of ores containing such reserved uranium in consonance with the Commission's authority. The Commission also wishes to encourage prospecting for new deposits of uranium ores on the public domain. Valid locations may be staked on such deposits if the uranium occurs in a deposit valuable because of other minerals. In the event of the discovery of a deposit of uranium-bearing ore which does not contain some other valuable mineral, the Commission, upon notice, will take steps to protect the prospector's equity; (2) If you have a sample of material, other than carnotite-roscoelite ore of the Colorado Plateau, you may send it to the New York Office of the Division of Raw Materials of the U. S. Atomic Energy Commission for free examination and analysis; (3) We do not have the personnel to make examinations of properties on request unless there is good reason to believe that the properties in question have real merit; (4) Anyone with uranium for sale to the Government should get in touch with the Division of Raw Materials in Washington and discuss a contract; (5) As required by the Atomic Energy Act, the Commission licenses all transfers of source material after its separation from its place of deposit in nature. You must apply to the Commission for an appropriate license if you want to buy or sell uranium or thorium ore after it has been mined; (6) The most onerous part of getting involved with atomic energy is "security." Persons having access to restricted data must first have formal Commission clearance based upon an FBI investigation. We will make your dealings with the U. S. Atomic Energy Commission as painless as the laws and the necessity for maintaining secrecy covering our plant feeds will permit.

Few prospectors, geologists, or engineers know much about uranium ore occurrences or are familiar with the new techniques required to appraise them. The Commission has arranged with the U. S. Geological Survey for future publication of a "Prospectors' Guide." This guide describes uranium ores and the approved methods of prospecting for them.

As members of the mining industry and as citizens, every American should take a deep interest in the Atomic Energy Act of 1946 and the raw materials program of the AEC.



Drilling program at Castle Dome has increased reserves

Advances in Milling Practice

JOHN F. MYERS and F. M. JARDINE, Session Chairmen

Recent Advances in Milling Practice

By **W. L. Zeigler,** General Manager
Pend Oreille Mines & Metals Co.

RESEARCH was at low ebb during the war as many technical men were called into the armed service and others into governmental agencies. Underground miners left the mines for higher wages in construction for military purposes and mills were forced to treat old tailings accumulations and mine dumps of low mineral content. As labor rates and the price of material increased, the only alternative against high milling cost has been to increase the size of units in the plants.

In larger mills, rod mill installations are becoming more common to take the place of tertiary crushing and laps somewhat into the field of ball-mill grinding. Several concentrators recently installed rod mills 9 by 12 ft long. Consolidated M & S Co. of Canada is now installing a rod mill 11½ by 12 ft long, the largest mill of this type ever attempted.

The trend for more than 20 years has been toward larger grinding units. No extra labor is required in the operation of them, and regulation is easier than on smaller circuits. Coarser feed may be ground in larger diameter mills with smaller balls, and the amount of ore ground per ton of balls in them is greater. One installation is being put into operation with a regrind mill over 9 ft in diameter.

The use of ball mills for grinding was made economical in milling by closed circuit arrangements with classifiers. Recently spiral classifiers with triple-pitch flights have been made to provide greater sand-raking capacity at lower spiral speeds. Modern rake-type classifiers resemble the original invention only in principle. Neither type machine is efficient when the amount of fines in the return sands is considered.

The use of flotation reagents has changed basically but little in years. Several chemical companies have done good work in standardizing reagents and bringing new ones into the field. In flotation machines, some retain the flow of pulp over wiers in each cell for the regulation of pulp level and others bank the cells into multiples with a single pulp level regulation on as many as eight large cells with individual adjustments on the froth discharge. The size of cell banks has kept pace with the increased capacity of grinding machines and units of 1000 tons per 24 hours are in operation. Bulk flotation concentrates are still made but the tendency is in favor of making each concentrate at the proper place in the circuit. A notable exception is the recovery of a small amount of molybdenite from greater bulk of copper concentrates, also copper from bulk lead concentrates.

Heavy Media separation, or the Sink-Float process, has become an important part of mineral beneficiation. It is now used in coal preparation, fluorite, tin, garnet, separation of magnesite from dolomite, and notably on lead-zinc ores where clean waste is present in coarse sizes within the range of the process. Reeves MacDonald Mines has a mill of 1200 tons per day well along, while Pend Oreille Mines is preparing to construct a new plant of 2400 tons in units of 800 tons per day. The Bunker Hill mill at Kellogg is being expanded by the enlargement of the Sink and Float plant and replacement of present 8-ft ball mills with larger units.

If the unprecedented demand for the metals continues, it is apparent that lower grade ore bodies will be worked and mineral-dressing plants must be accordingly revised and processes adjusted in balance with the record high prices of metals at present.

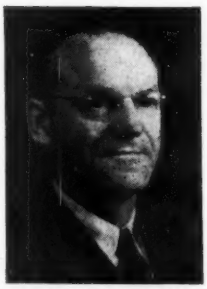
— *Discussion* —

CONSIDERABLE discussion followed the presentation of Mr. Zeigler's paper. Among those taking part were E. W. Englemann, general superintendent of mills, Utah Copper Co., Magna, Utah; Walter C. Page, vice-president and general manager, U. S. Smelting, Refining & Mining Co., Salt Lake City; Harlowe Hardinge, president and general manager, Hardinge Co., Inc., York, Pa.; and Seldon Rodgers, mill superintendent, Anaconda Copper Mining Co., Anaconda, Mont. Mr. Rodgers reported on the new liners used in the mill of the Anaconda Copper Mining Co.

In their case he said the ore is quite sticky and as they already had their crushing plant it couldn't be modified to give any finer feed. It is a 9 by 12-ft rod mill and handles approximately 2000 tons in 24 hours running about 16.6 rpm.

The original liners went out at about 100,000 tons. This original set of liners had a rather fine wave pattern and soon wore perfectly smooth. The problem was solved by using a liner with wide bars to cut down slipping. The bars are 8 in. wide and stand up 1⅝ in. above the valley of the liner. The first set that went in lasted for 345,000 tons and the second set was in use for 440,000 tons.

Comminution — Crushing Or Grinding?

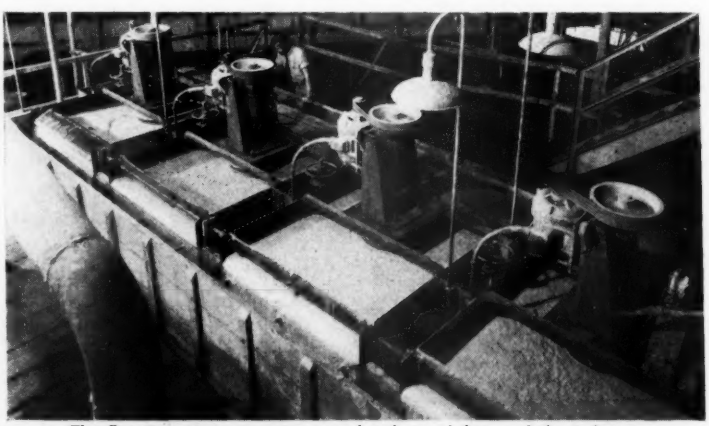


By **A. W. Fahrenwald,** Dean
School of Mines
University of Idaho

IT has been shown that the most efficient ball mill is only 50 percent as efficient as the laboratory drop-weight method of crushing. Experimental data developed with the crusher used in the laboratory is 200 to 300 percent, or 2 to 3 times efficient as the ball mill. To date the experiment has not gone further than the laboratory scale, but past experience attaches considerable weight to the value of the results of laboratory research and experimentation.

A simple experiment demonstrates the concept of common usage. If a piece of rock be placed between the jaws of a vice and the jaws forced together, the rock pieces are reduced to two stages; one of crushing and one primarily of grinding. The vice study can be further refined to simulate true jaw-crusher action by controlling the stroke and compression ratio.

Machines to investigate these principles include a small standard ball mill and the small specially-designed crusher for laboratory reduction crushing. The crusher is a flathead, ball-bearing, V-belt driven, high-speed machine, capable of operating under either free or choke-feed conditions.



The flotation process continues to be the work horse of the industry

Kennametal Rock Bits

Save Time, Cut Costs

DO THE JOB FASTER

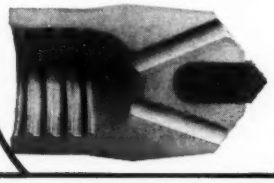
FEW BITS— FEW CHANGES

Kennametal Rock Bits have resistance to gage reduction 100 times greater than steel. Same size bit can be used on all drill rods. A full day's work frequently is done by the same bits on their respective drill rods.

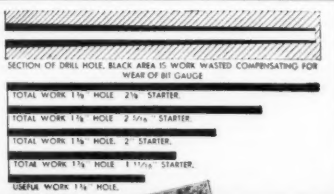
DRILL FAR LONGER THAN STEEL BITS

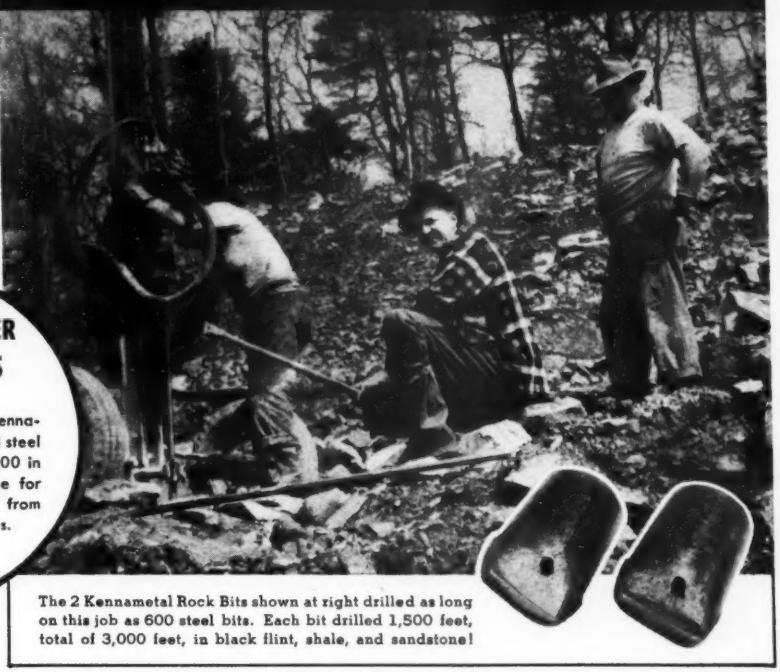
In Cambria County, Pa., 1 Kennametal rock bit outlasted 188 steel bits, and saved about $40.00 in bit cost alone. Drilling time for the footage was reduced from 1210 minutes to 308 minutes.

THIS IS THE DESIGN— COMPLETELY PROVED



Proof of Superiority of Single Gage Drilling with KENNAMETAL ROCK BITS


SECTION OF DRILL HOLE. BLACK AREA IS WORK WASTED COMPENSATING FOR WEAR OF BIT GAUGE
TOTAL WORK 1⅞" HOLE 2⅛" STARTER.
TOTAL WORK 1⅞" HOLE 2 5/16" STARTER.
TOTAL WORK 1⅞" HOLE 2" STARTER.
TOTAL WORK 1⅞" HOLE 1 11/16" STARTER.
USEFUL WORK 1⅞" HOLE.



The 2 Kennametal Rock Bits shown at right drilled as long on this job as 600 steel bits. Each bit drilled 1,500 feet, total of 3,000 feet, in black flint, shale, and sandstone!

Kennametal Rock Bits have a cutting edge of solid Kennametal that keeps gage loss to within thousandths of an inch. Its resistance to wear enables the bit to drill up to 4 times as fast, and drill smooth, uniform diameter holes in sandstone, granites, ganister, quartzite, limestones and other medium and hard materials.

Users of Kennametal Rock Bits report lower bit cost, better blasting effectiveness, far fewer bits used per foot drilled. Kennametal Bits can be used on sinkers, drifters, stopers, and wagon drills, without any conversion of equipment. They screw on standard drill rods.

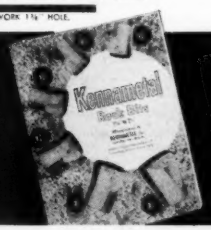
For complete particulars on how Kennametal Rock Bits can reduce your drilling costs, ask for Bulletin RB-1. Write to Mining Division, Kennametal, Inc., Latrobe, Pa.

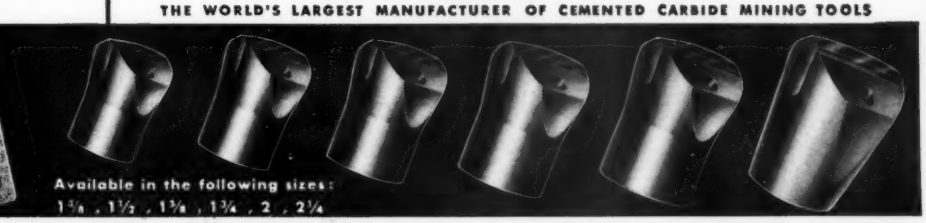
MINING DIVISION

KENNAMETAL ® *Inc.*

Latrobe, Pa., U. S. A.

THE WORLD'S LARGEST MANUFACTURER OF CEMENTED CARBIDE MINING TOOLS



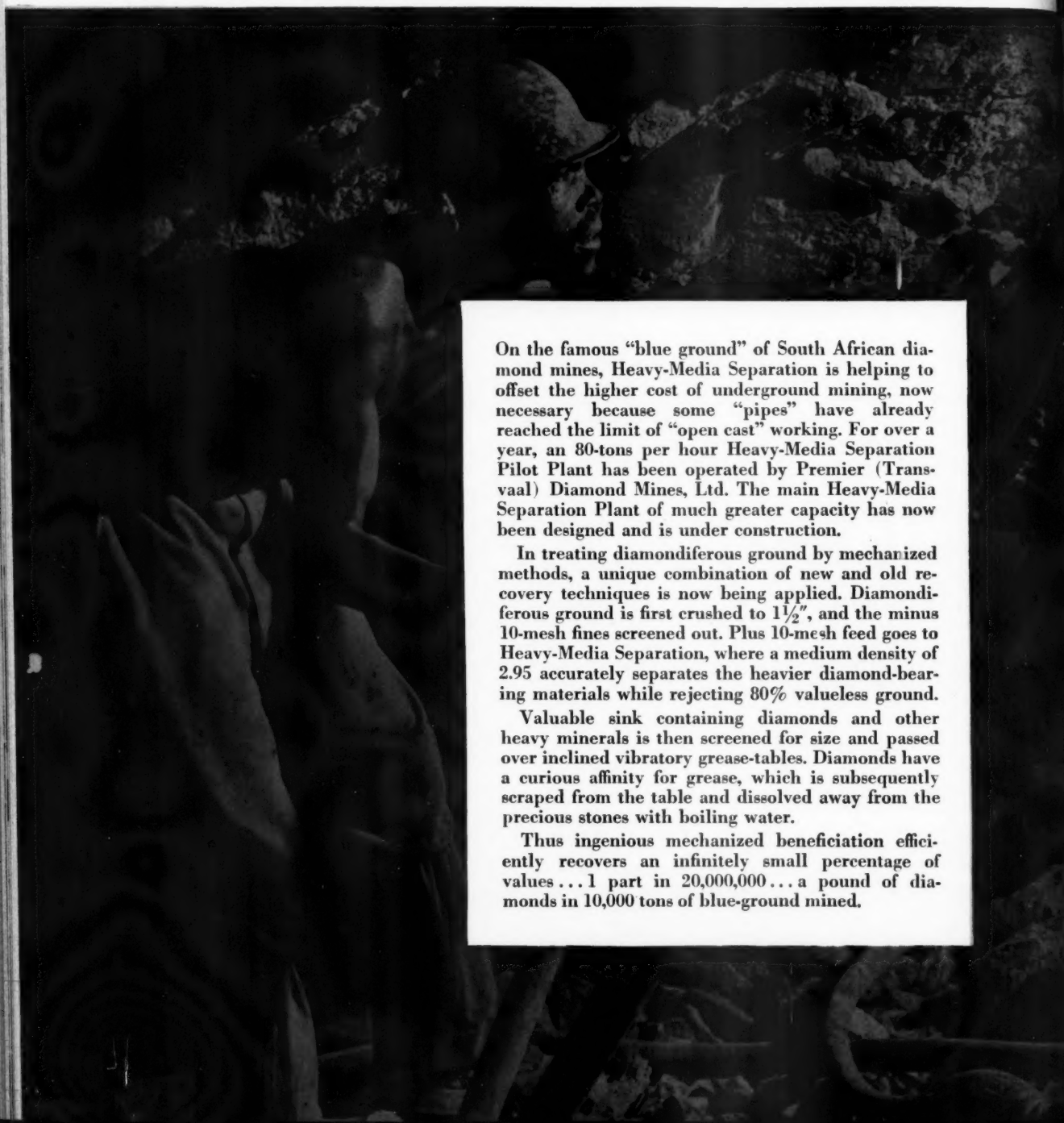


Available in the following sizes:
1⅝ , 1½ , 1⅜ , 1¼ , 2 , 2¼

HEAVY-MEDIA SEPARATION

so ACCURATE

it is being used to treat DIAMONDIFEROUS GROUND

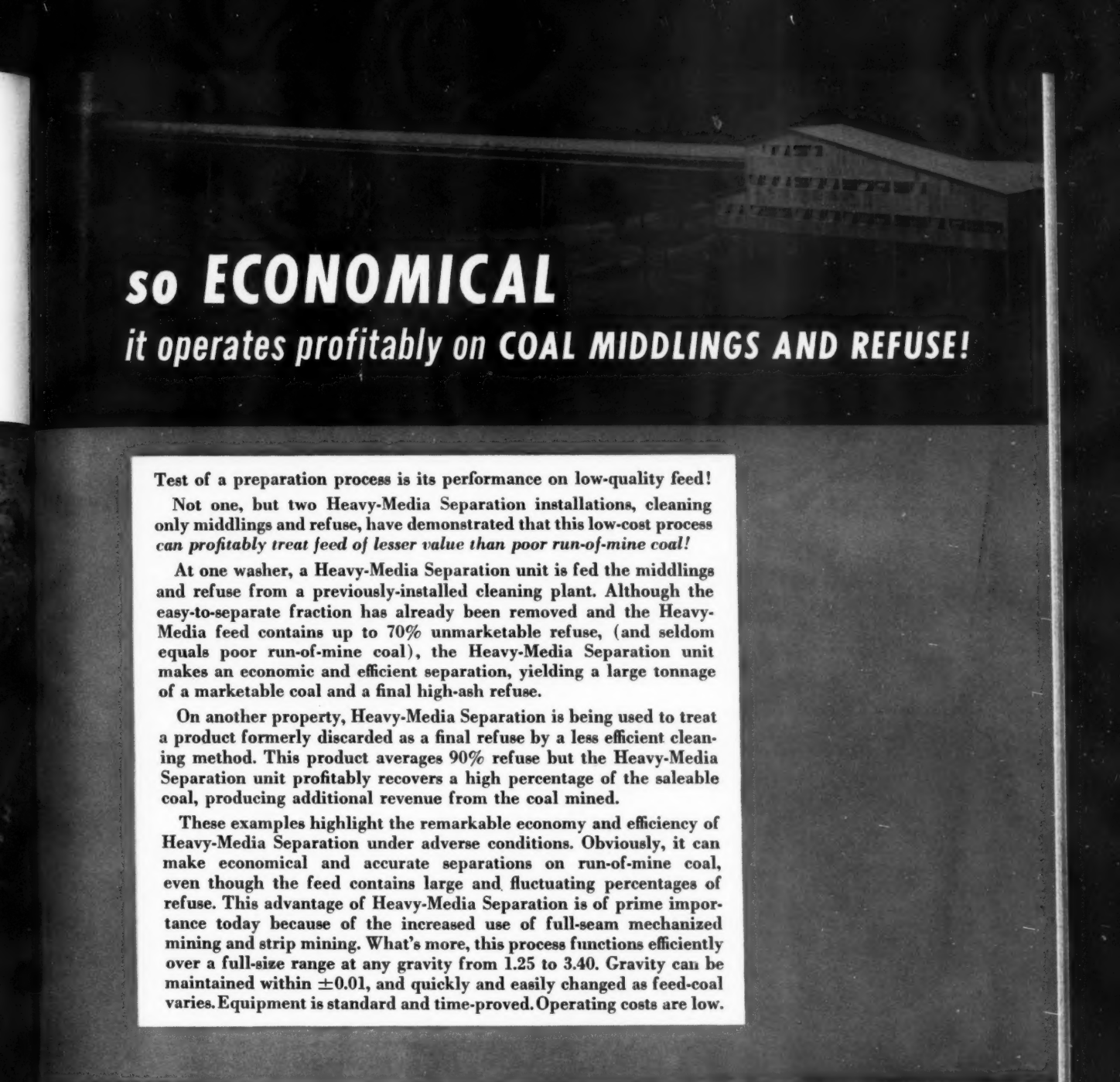


On the famous "blue ground" of South African diamond mines, Heavy-Media Separation is helping to offset the higher cost of underground mining, now necessary because some "pipes" have already reached the limit of "open cast" working. For over a year, an 80-tons per hour Heavy-Media Separation Pilot Plant has been operated by Premier (Transvaal) Diamond Mines, Ltd. The main Heavy-Media Separation Plant of much greater capacity has now been designed and is under construction.

In treating diamondiferous ground by mechanized methods, a unique combination of new and old recovery techniques is now being applied. Diamondiferous ground is first crushed to 1½", and the minus 10-mesh fines screened out. Plus 10-mesh feed goes to Heavy-Media Separation, where a medium density of 2.95 accurately separates the heavier diamond-bearing materials while rejecting 80% valueless ground.

Valuable sink containing diamonds and other heavy minerals is then screened for size and passed over inclined vibratory grease-tables. Diamonds have a curious affinity for grease, which is subsequently scraped from the table and dissolved away from the precious stones with boiling water.

Thus ingenious mechanized beneficiation efficiently recovers an infinitely small percentage of values . . . 1 part in 20,000,000 . . . a pound of diamonds in 10,000 tons of blue-ground mined.



so ECONOMICAL

it operates profitably on COAL MIDDLINGS AND REFUSE!

Test of a preparation process is its performance on low-quality feed!

Not one, but two Heavy-Media Separation installations, cleaning only middlings and refuse, have demonstrated that this low-cost process *can profitably treat feed of lesser value than poor run-of-mine coal!*

At one washer, a Heavy-Media Separation unit is fed the middlings and refuse from a previously-installed cleaning plant. Although the easy-to-separate fraction has already been removed and the Heavy-Media feed contains up to 70% unmarketable refuse, (and seldom equals poor run-of-mine coal), the Heavy-Media Separation unit makes an economic and efficient separation, yielding a large tonnage of a marketable coal and a final high-ash refuse.

On another property, Heavy-Media Separation is being used to treat a product formerly discarded as a final refuse by a less efficient cleaning method. This product averages 90% refuse but the Heavy-Media Separation unit profitably recovers a high percentage of the saleable coal, producing additional revenue from the coal mined.

These examples highlight the remarkable economy and efficiency of Heavy-Media Separation under adverse conditions. Obviously, it can make economical and accurate separations on run-of-mine coal, even though the feed contains large and fluctuating percentages of refuse. This advantage of Heavy-Media Separation is of prime importance today because of the increased use of full-seam mechanized mining and strip mining. What's more, this process functions efficiently over a full-size range at any gravity from 1.25 to 3.40. Gravity can be maintained within ±0.01, and quickly and easily changed as feed-coal varies. Equipment is standard and time-proved. Operating costs are low.

From one extreme to the other . . . from diamonds to refuse . . . proof positive of the efficiency and economy inherent in Heavy-Media Separation.

Today Cyanamid offers a complete range of Separation Processes by Gravity Difference (Heavy-Media Separation and the Dutch State Mines Cyclone Separator) for new cleaning plants or as adjuncts to present washers.

With a process for every size and specification, and no self-interest in equipment manufacture or plant construction, Cyanamid offers unprejudiced counsel on coal cleaning based on tests of your coal by various preparation processes in the Cyanamid Mineral Dressing Laboratory at Stamford, Conn.

We invite discussion and stand ready to run carload tests on your coal; to cooperate with engineers of your choice in the design of the most efficient separation units into your cleaning plant, and to provide the assistance of Cyanamid Field Engineers in tuning up the installation.

AMERICAN Cyanamid COMPANY

TRADE MARK

30 ROCKEFELLER PLAZA, NEW YORK 20, N.Y.

UNION PACIFIC

The Governor of Montana *invites You*

State of Montana
Office of The Governor
Helena

SAM C. FORD
GOVERNOR

To American Industry:

Montana has developed only the most obvious of its many resources in the agricultural, lumbering and extractive industries.

Our state agencies, industrialists and businessmen, working through the Industrial Development Division of the Montana Chamber of Commerce, are ready to help prospective industries. We have prepared for your inspection exhaustive briefs on the following: Coal Chemicals, Plywood, Pulpwood, Wool Processing, Chinaware, Phosphates, Travertine, Corundum, Oil By-products, Paint Pigments and Metal Fabrication.

Outstanding advantages are low-cost Hydro-electric Power, Natural Gas and Coal, intelligent labor, superb natural surroundings, an invigorating climate and a relaxed, Western way of life.

On behalf of my fellow Montanans, you are invited to make this pleasant land—the Treasure State—your home and your future.

Cordially yours,

Sam C. Ford

Governor

Sam C. Ford

* *One of a series of advertisements based on industrial opportunities in the states served by Union Pacific Railroad.*

Unite with Union Pacific in selecting sites and seeking new markets in California, Colorado, Idaho, Kansas, Montana, Nebraska, Nevada, Oregon, Utah, Washington, Wyoming.

*Address Industrial Department, Union Pacific Railroad
Omaha 2, Nebraska

UNION PACIFIC RAILROAD

Road of the Daily Streamliners

The little ball mill was also a ball-bearing mounted machine. Three types of rock feed were employed; namely, magnesite, pure quartz, and run-of-mine ore from the Yellow Jacket mine, Lemhi County, Idaho.

Results of the first preliminary experiments were so unexpected, so seemingly significant that tests were run on different types of rock and by three individual experimenters.

The ball mill was operated in an enclosed circuit, just as was the crusher, and five complete cycles made with screenings between cycles. Minus 48 mesh was taken out between cycles and plus 48 was put back in along with new feed to make up the original charge to the mill. The average of the last three cycles of operation of the ball mill resulted in 7.89 grams per watt minute of energy input.

Using the little 6-in. crusher, the first phase of minus ½ in., plus ⅛ in. gave 6.78 grams per watt minute of energy input. Then, as the enclosed circuit operation was continued the output increased to 12.9 then 18.24, 19.08, 19.02, and 21.84. Hence, from the basis of 100 percent efficiency with the little ball mill, by a similar process of division, the crusher has efficiency up to 300 percent.

The crusher was operated dry in all instances and the ball mill was operated wet. Circulating load in the case of the ball mill was 827 percent and, in the case of the crusher 800 percent.

By **F. C. Bond,** Director
Basic Industries Research
Allis-Chalmers Mfg. Co.

FROM standard grinding ability tests on samples of magnesite it has been calculated that the energy required in the average wet-grinding ball mill, to accomplish the reduction obtained in Dean Fahrenwald's crusher, would be 6.28 kwhr per ton of new feed; and the energy required to obtain the reduction accomplished in his ball mill would be 7.09 kwhr per ton of new feed. These calculated energy values represent the total energy input to the mills, including the friction or idling loads.

In evaluating Dean Fahrenwald's results, his total energy input values to the machines were used instead of the net energy input with the energy required for running idle substracted. This was done for several reasons. In the first place the energy required to run a crusher idle is certainly different from the friction losses when the crusher is working because of great difference in bearing pressures. The work required to rotate a grinding mill with its ball charge is almost as large without material being ground as it is when the mill is grinding.

It is felt that the total energy input to the machine is the only practical measurement of the actual energy required. The energy required to run a crusher idle, or to run a ball mill without the ball charge centered in the mill, cannot be used fairly for comparison or to evaluate the actual energy required for comminution. The additional energy required to operate the machine without loads cannot be avoided indefinitely.

The data on Dean Fahrenwald's laboratory crusher indicates that it requires slightly more energy input per ton of feed than would be required for the same sizes reduction by wet grinding in an ordinary commercial ball mill. However, the total energy required for grinding in his laboratory ball mill is almost four times as great as that calculated for a normal commercial mill. It appears that the advantage shown by the laboratory crusher in his paper is largely or entirely the result of the excessive energy required by his laboratory ball mill, and that his laboratory crusher shows no advantage over commercial grinding results in the same size range.

In Mr. Bond's absence, this paper was presented by T. V. Canning, Sales Engineer, Basic Industries Dept., Allis-Chalmers Mfg. Co.

By **H. M. Zoerb,** Chief Engineer,
Crusher Division
Nordberg Mfg. Co.

WHEN further advances in comminution were made I question whether it will be by a ball mill or a gyratory crusher. It will be an entirely different principle.

Crushing takes place when a single force acting on a particle has a single reaction through, or approximately through, the same point. A piece of rock, or ore, squeezed between two parallel faces, or a baseball hit squarely by a bat, illustrates this point. On the other hand, when a single force acting on a particle has a resultant reaction made up of components, either one of insufficient magnitude to crush, but able to cause slippings, turning, and twisting, we have grinding. A piece of rock, or ore, squeezed between two faces which are paralleled to such a degree to cause slipping would roughly illustrate grinding.

We have mass crushing when one particle about to be crushed acts upon other particles all subjected to the same crushing force. We have attrition crushing when particles subject to similar crushing forces rub against each other to their destruction. It is obviously impossible to limit one or the other in any one operation.

It appears that some device employing both the blow and squeeze presents the greatest possibilities. The ideal apparatus for comminution would have the following characteristics: impact, so as to make most use of the WR^2 of the moving parts, or the inertia of the piece to be crushed; mass crushing, so as to make use of particles as crushers on each other and thus reduce metal wear; maximum action range between crushing and compacting; and minimum of friction or grind so as to reduce metal wear and inefficient power application. The question of crushing or grinding wet or dry takes the position of secondary importance if the above characteristics are used as an objective. The ideal apparatus for comminution operates dry although general practices is quite to the contrary in the final stage of the reduction due to other factors such as dust, classification, and transportation which are not a part of the crushing art.

Instrumentation And Automatic Control of Milling Plants

By **I. M. LeBaron,** Supervisor of Phosphate Research
International Minerals & Chemical Corp.

Dr. LeBaron's paper appeared in full in the October issue of MINING CONGRESS JOURNAL.

Automatic Measurement And Control Problems in Ore Concentrating Plants

By **C. M. Marquardt,** Electronic Engineer
Combined Metals Reduction Co.

AT the Combined Metals Reduction Co. where we treat as many as 14 ores on a custom basis, management was faced with the problems that come with numerous ore changes. Radical changes in ore made the pH electrodes foul. We rebuilt the electrode assemblies so that they can be cleaned quickly. We have six electrodes placed along the lead, zinc, and iron circuits, and changes in ore are usually caught immediately. Our technical staff has found the pH records most helpful in the process and in guiding future design.

We wished to measure the pulp density in the classifier pool itself using a 3 in. differential on the bubble tubes. That meant measuring a minimum differential pressure of the order of magnitude of 0.15 in. of water. We developed an electronic manometer, or differential pressure device, capable of measuring differential pressures in the neighborhood of 1/1000 in. of water, and yet has substantial power output for the operation of a pen

C. M. Marquardt

or control apparatus. This instrument is not affected by line voltage variations and is extremely rugged. Vibration does not impair the accuracy or reliability of operation. A special bubble tube was devised that is not affected by turbulence.

In most applications where bubble tubes are used there is considerable difficulty due to sanding and clogging of the bubble tube orifices. This has been eliminated through an electronically controlled arrangement for periodically flushing out the bubble tubes from the inside with high pressure water, without in any way affecting the accuracy of the meter or injuring it. The instrument is readily adaptable to multiple recording from a single manometer. A density meter now under construction will measure the pulp

density in six places in the circuit. Results will be recorded by an electronic strip chart recorder of standard manufacture.

The absence of moving parts, the extreme sensitivity and stability of electronic circuits, the large power-handling capabilities, and the reliability of tubes makes electronics desirable under the rugged conditions that prevail in ore-concentrating plants. A properly designed and constructed electronic device will require less maintenance than its counterpart in a mechanical device.

An Over-all Look at Process Control Instrumentation

By **R. E. Byler**
The Merrill Company

IN the processing of minerals, the use of process control instrumentation is changing and in recent years considerable know-how has been accumulating on the application of modern control devices to our mineral processing operations. Perhaps in mineral beneficiation, we may never utilize automatic controls as fully as the chemical and petroleum industries, because of the nature of our raw material and processes. Certainly the automatic mill is not just around the corner—for us, although the Noralyn Mill seems to have gone a long way towards full automatic control.

When we consider the over-all problem, the question, "How much automatic control and instrumentation can I profitably use in my plant" requires a good bit of answering. To analyze any application of automatic control we must determine: what should be controlled; how it can be controlled; and why the control would be profitable.

The usual objective of automatic control is to balance an unstable condition, within such limits that the process proceeds at its maximum efficiency. To determine how to maintain this desired condition, we must have a clear picture of what the independent and dependent variables are, and their influence on the "balance" of the condition we want to maintain. To apply automatic control, we may measure the change in one variable but actually exert control, or balance, on the operation by adjusting another variable.

It is helpful to know where the other fellow, operating a similar process, has applied automatic controls and instrumentation, and how control is effected. But automatic control and automatic regulation must be "tailor-made" if a high quality of control is to be obtained.

Excluding control devices that protect the health, or insure the safety of the men, I believe we can say with assurance that no matter how clever or ingenious the automatic control device or system may be, its installation is not justified unless it results directly or indirectly in a tangible economic benefit.

The benefits derived from process controls or instrumentation may fall into one or more of several categories: Improvement in metallurgical recoveries; continuous intelligence as to trends; savings in power or supplies; an increase in capacity; reduction in cost of attendance; and the elimination of human error.

The shortage of experienced men, the passing of the old reliable stay-on-the-job mill operator, and the current high wage levels, make the consideration of a fuller use of controls and instrumentation a timely subject. If an over-all use of more controls and instrumentation in a mineral processing plant will take the place of one or two men per shift, the benefit is likely to be well demonstrated.

Charges for amortization of the installed cost of the proposed instrumentation and control system, maintenance charges, including servicing, supplies, and repair of the instruments must be considered. The total installed cost of the controls and instrumentation must include the development work involved.

The over-all survey of the plant to determine the what, how, and why of possible instrumentation may not be an easy job—nor a short one, if the processing operation is complex—but it most certainly is a worthwhile one.

Mechanization of Mining Operations

R. J. MECHIN, Session Chairman

The Role of Mine Research in The Development of Labor Saving Methods And Equipment

By **E. R. Borcherdt**, Chief Research Engineer
Anaconda Copper Mining Co.

The first section of Mr. Borcherdt's paper appears on page 32 of this issue. The second section will be published in the December issue of MINING CONGRESS JOURNAL.

An Underground Self Loader

By **E. I. Hayes**, Western Manager
American Zinc, Lead & Smelting Co.

A SELF-LOADING transport is a new development in a loading machine for rock and other materials. A replica model of 5-ton, self-loading transport built on a linear scale of 1 in. to the foot was displayed. The model itself is an effective mucking machine, and when operated with strings on the table will muck, transport, and dump its size rock, paper weights, inkwells, and detachable rock bits.

The self-loading transport has six steel wheels of 12 in. diam with 6 in. wide tires. It is a trackless machine. It clears and grades its own roadway. It cleans and scoops up a muck pile in the same manner as a hand shoveler. It will load and grade when the muck is scattered and it does not matter whether the muck pile is inches or feet in thickness.

In operating, the self-loading transport is pulled forward by the slusher cable or

E. I. HAYES

pushed by a tractor from the dumping point to the material to be loaded. When the dipper is full, it is elevated by applying the slusher pull-back drum which folds and crowds the dipper load into the transport compartment. In the dipper elevating movement, the entire machine moves backward about 10 ft where pulling is stopped and the dipper automatically pulls down by gravity into the shoveling position. Then it is pulled forward for another dipper full, elevated, and folded back into the compartment as before. These motions are continued three or four times, occupying 40 to 60 seconds, and a full capacity load is now on wheels. The final dipper-full blocks itself and the operator keeps pulling on the machine and it takes off as a transport and is pulled to the dumping point, where the dump door in the rear of the machine automatically drops down, permitting automatic elevation of the bottom of the compartment so that the machine discharges its entire load on an inclined chute.

The self-loading transport can be built in almost any size to handle one ton, two tons, or about five tons. It requires low head room. In the case of the one-ton machine, the maximum folding height would be about 4 ft. As to capacity, a two-ton machine, with one operator, at 100-ft transport distances, will load, transport, and dump into a chute at the rate of about 60 tons per hour. This includes the time used in breaking or moving out of the way, with the machine, large boulders that cannot be handled through mine chute gates and crushers. A 25-hp slusher hoist will operate a two-ton machine.

A Summary of Experience in The Use of Tungsten Carbide Bits in Rock Drilling

By **Blair Burwell**, President
Mineral Engineering Co.

IT has become increasingly evident from experience with new bits that the introduction of a tungsten-carbide cutting edge to a rock drill bit involves much more than a simple substitution of a carbide-tipped bit for a steel bit. Eventual redesign of rock drills, drill feeds, and bit attachments to fit the special qualities of tungsten-carbide cutting edges will be required before the full advantages of tungsten-carbide bits can be realized.

American rock drills have reached a high degree of mechanical perfection for

drilling short holes of relatively large diameter with steel bits. Initial work on tungsten-carbide bits in this country consisted of the attempted adaption of European development to our more powerful rock drilling machines and larger and heavier drill assemblies.

In European practice, the most successful use has resulted from drills where the

Blair Burwell

cutting edge is attached directly into the end of alloy drill steel. The failure of threaded joints is avoided as well as the necessity of the larger diameter of drill steel and bit required for threaded connections. American tungsten-carbide bit manufacturers have greatly improved the type of insert and the method of holding it in the bit. Relatively large diameter bits are now satisfactory, under favorable conditions, for use in heavy drills.

Tungsten-carbide tipped drills were successfully used in Germany ten years ago. War-captured records indicated the use of tungsten carbide as a regular tool in a number of important German mines. Swedish developments reflected the German developments insofar as they emphasized the factors of small holes, light drills, and avoidance of threaded joints.

In general, European types of tungsten-carbide bits have developed with a consistency of performance in all types of rock-drilling machines that has not been noted in this country.

In order to obtain satisfactory use of a tungsten-carbide bit with a relatively powerful rock drill, the alignment of the drill is important; and the use is limited to drills providing good alignment. If, however, the same bit is used in less powerful machines adapted to the tungsten-carbide tool, the factor of safety in the strength of the carbide insert is sufficient to allow the consistent use in all types of drills.

The results obtained with good alignment and light drills with four-point bits often approaches the phenomenal. At the Cactus Rat Mine in Utah, drilling is done by a wagon-type drill using a 65-lb machine, consuming 100 ft of air per minute. Bits are the four-point detachable type of 1½-in. diam used on alloy drill rods.

The following tabulation of results is shown in Table I.

Recent reports emphasize the basic relation of alignment and controlled feed in the life of a tungsten-carbide bit.

A substantial saving of explosive costs, with equal or superior fragmentation, are possible with small diameter blast holes. After overcoming the initial objection of miners to small holes, it was found that more consistent breakage and footage per round were obtained with small holes than with large holes; and a substantial saving in explosive use resulted. It is indicated that explosives of higher strength and smaller diameters to fit small drill holes should be used in place of bulk-type powders often used for the physical filling of over-large drill holes. The savings effected may be one of the more important contributions of the tungsten-carbide bit to improvements in mine drilling practice.

Opinion among manufacturers as to the most satisfactory type of bit connection still differs widely. The experience and opinion of the mining industry using the bits is that the average threaded connection used with detachable bits is still far from satisfactory. Alloy drill rods appear to be necessary. As threads are difficult to cut on suitable fatigue-resisting alloy steel, an intermediate member or connection is provided between the bit and the drill rod. So far, however, this operation requires above-the-average small mine drill shop equipment and control. Where threaded detachable bits are designed to be used directly on threaded drill steel, carbon drill steel is usually used, due to threading problems of alloy steel. The joint is the weakest part of the assembly. The attachment of the drill bit to the rod by welding is under development.

If the life of the carbide insert, the drill rod, and shank are developed to an equal point, the use of tungsten-carbide bits would best be effected by the manufacture and sale of a complete drill rod and bit, factory attached for the life of the unit. The problem of service and distribution of such a tool, however, would be a difficult one.

Table II above gives an approximation of average experience with tungsten carbide bits.

The worth of tungsten-carbide bits cannot be gauged by the relative cost of drilling holes per foot, in comparison with steel bits, because of other important related economies which are now indicated, such as better explosives use and lesser explosive costs, labor attendance, and reduced air consumption. The promise of a real advance in mine mechanization by drilling improvements is close to realization.

TABLE I

No. of Holes	Average Depth	Total Footage	Footage per Bit	Breakage
220	18	3960	1320	none

TABLE II

	Very Hard Rock	Hard Rock	Average Rock	Soft Rock
Life of steel bits.....	1″ to 1′	1′ to 4′	6′ to 12′	30′ to 60′
Life of tungsten-carbide bits.....	8′ to 100′	75′ to 150′	150′ to 350′	300′ to 1300′
Drilling speed—tungsten carbide, inches per minute.....	10″	14″	16″ to 24″	24″ to 30″
Drilling speed — steel, inches per minute..	6″	8″	10″ to 16″	18″ to 20″

— *Discussion* —

By **Joseph H. Taylor,** Vice-President
Peru Mining and Smelting Co.

ORIGINAL tests made at the Kearney mine, Hanover, N. Mex., in October, 1947, with Ingersoll-Rand series 13, 1½-in. Carset bits were so satisfactory that more of these bits were ordered for further tests. In January, 1948, all operations at the Kearney mine were changed to tungsten carbide bits.

As the miners became more familiar with the use of the tungsten-carbide bits, the average footage drilled per bit increased. In August, 1948, 10,402 ft were drilled with 29 new bits, each bit drilling an average of 358 ft. For the first eight months of 1948, the average footage drilled per bit was 217 ft.

Most bit failure is due to an insert being crushed or dislodged. Approximately 42 percent of the bits finally failed because of crushing or dislodged inserts after considerable wear. If one insert is destroyed the bit is still usable as it also is if two opposite inserts are destroyed. However, if two adjacent inserts are destroyed the bit is considered to be of no further use. About 27 percent of the bits going into the mine are either lost or not returned. The third cause for failure is failure of the skirt of the bit. About 21 percent of the bits fail for this reason. About 10 percent of the bits fail because of worn out threads.

Experience in the Kearney mine gave a cost of 12¢ per ft with detachable bits and 6¢ per ft with tungsten-carbide bits. Drilling with the Carset bits was accomplished about twice as fast as with detachable bits or conventional steel. It is rare that a miner fails to get his round in and ready for blasting before the end of the shift. In garnet and magnetite gangue, with tungsten carbide bits, the drilling progresses at the rate of 12 to 16 in. per minute.

Less air is required to be compressed for drills and the amount of powder used has been reduced by the use of tungsten-carbide bits. Machine repairs are considerably less.

In Mr. Taylor's absence, this paper was presented by G. T. Harley, Mgr., International Minerals and Chemical Corp.

By **William J. Loach,** Manager
Wolf Tongue Mine, Boulder, Colo.

CONSIDERABLE difficulties have been experienced in breakage of the skirts of tungsten-carbide bits. The problem has been licked and the Firth Sterling Steel and Carbide Corp. is announcing a tungsten-carbide bit that we feel is going to be satisfactory to the mining industry.

By **John J. Curzon,** Manager
Chelan Division, Howe Sound Co.

AT the Holden mine, with recent increases in diamond costs, experiments with insert bits were begun last January. The principal problems were in the design of a suitable coupling to enable maintenance of the mining system based on long blast holes for ore breaking.

A total of 59 bits have been used with an average footage of 54.2 ft. Bits are run 12 to 15 ft before regrinding and are given five or six regrinds. A regrind consists of touching up the cutting edge of the insert bit.

With a diamond drill an average of 27.7 ft per man per shift has been maintained. With the percussion drill and a 28-man shift, an average of 76.5 ft per man per shift has been maintained. Holes drilled with tungsten-carbide bits are not over 35 ft in length. But at eight tons per lineal foot of hole that means quite a lot of production.

Future plans call for attempts to lengthen the hole drilled with carbide bits to 65 and 70 ft. If success is obtained, diamond drills will be replaced by percussion drills equipped with tungsten-carbide bits.

Development of High Speed Tunneling on Pacific Gas & Electric Hydroelectric Projects

By **H. W. Haberkorn,** Engineer of Hydroelectric Construction
Pacific Gas & Electric Co.

THE mining industry concerns itself with digging out the various ores to convert them into useful metals; the power industry concerns itself with mining white gold, the potential energy of fresh water, and converting it into electrical energy that makes our modern industrial development possible. Both industries are interested in making the products of their efforts available at the lowest possible price consistent with a fair return to those who take the financial risk, the investors.

The Pacific Gas and Electric Co.'s system, with a peak load in excess of 2,100,000 kw, produces over one-half of its power from its 42 hydroelectric plants. Tunnels, forming an important part of the several structures required to conduct the water from the point of diversion or storage to the turbines driving the generators, aggregate a total of 80 miles. They vary in cross section from 8 by 10 ft to the huge 25-ft and 27-ft tunnels of the Feather River Project.

Problems encountered in constructing tunnels for carrying water to hydroelectric plants, differ as compared with tunnels for mine development. In the simplest case, a tunnel for a hydroelectric development carries water from the point of diversion or storage reservoir to a point above the stream bed where a suitable site exists for a powerhouse, and where sufficient difference in head is available to produce a quantity of power that will economically justify the cost of the development.

The plan adopted for driving a power tunnel is usually dictated by the time available as well as by the typography. Since the initial investment in tunnels represents 30 to 60 percent of the total cost of hydroelectric development, it is desirable to use the smallest cross section which will carry the required volume of water, providing that it is also the most economic size from the consumption standpoint. A great difference between water tunnels as compared to mine tunnels is the temporary nature of many of the facilities used in constructing the water tunnels.

Improvements in technique have brought tunnel driving to its present-day high state of efficiency. Drilling has advanced through the use of automatic feed drills and changes and improvements in drills, drill steel, bits and explosives. Some contractors believe in a large number of small-diameter holes drilled with 3 or 3½-in. machines although others select 4-in. machines to drill fewer holes of larger diameter. Hollow steel, for wet drilling, either 1⅛-in. or 1½-in. diam is standard. In addition to the conventional found-on-the-job drill rods and bits, a number of detachable bits are available, including the carboloy insert type and slip-on throw-away. The drill rig, or jumbo, used today primarily for reducing the time required to set up the drills, has grown from a simple arrangement of two or three tunnel bars mounted on a flat car, to elaborate and large-size structural frame-works operating on the same track used for hauling cars or more usually in large tunnels, running on a separate track straddling the haulage track to permit cars to pass under and through the jumbo. Nearly all loading, or mucking, in P. G. & E. tunnels driven during the last 20 years has been done with the Conway-type mucking machine. Switching and dumping facilities have been improved by utilizing a well-organized system together with up-to-date equipment.

Today, as in the past, the success of construction operations of any kind depend primarily on three factors:

Labor
Equipment
Management

The last is probably the most important of the three for through careful and efficient management and planning, the other two factors can be utilized in the most efficient manner possible, so as to counteract to a considerable degree, the effects of their high cost.

Tunnel Driving Practice on P. G. & E. Co. Mokelumne And Feather River Projects

By **J. E. Cooney,** Project Manager
Pacific Gas & Electric Co.

THE West Point Tunnel on the Mokelumne River is 2¼ miles long and located entirely in granite. It was driven by T. E. Connolly, Inc., of San Francisco. The 11-mile long tunnel is 13 by 15½ ft in cross section. Detachable 1½ in. Carset drill bits were used and 10-ft holes were drilled to break each 8-ft round. About 170 ft of hole could be drilled per bit, with one sharpening, greatly reducing the number of drill rods and weight of steel required per round drilled. The bits had other advantages including reduced air consumption through use of 3-in. drifters, and in reducing the amount of explosives required. Seven 3-in. machines operating under 90-lb air pressure and using 1⅛-in. alloy drill steel were mounted on a jumbo. An average drilling cycle is as follows:

Move in and set up jumbo	15 minutes
Drill (50 holes)	1 hour 50 minutes
Load holes	20 minutes
	2 hours 25 minutes

A pyramid center cut loaded with 60 percent powder pulled the core. Delayed exploders from No. 0 to No. 10 were used. As soon as the shot was fired a reversible Root blower, operating in the exhaust position for 10 minutes pulled the powder smoke from the tunnel and then the blower was reversed and fresh air pumped to the heading for the balance of the operations. A Conway 75-hp mucker was then moved to the face. A 4-yd capacity car was loaded every 5 minutes. Switching of cars at the face was done by means of a "cherry picker," or overhead hoist, mounted on a gantry jumbo approximately 100 ft from the face. A string of five cars was hauled from the tunnel by an 8-ton storage battery locomotive. Typical mucking round time requirements were as follows:

Time to clear smoke	30 minutes
Mucking	1 hour 55 minutes
Lay section of rail	15 minutes
	2 hours 40 minutes

With time out for meals, shift changes, and miscellaneous delays the contractor averaged 30 ft per day.

The 8½-mile long Electra Tunnel of the same cross section as the West Point Tunnel was driven from three adits by three contractors as a joint venture, under the name of Utah-Morrison-Walsh. The central 14,300 ft of Electra Tunnel was driven by Morrison-Knudsen Co., Inc., of Boise, Idaho. Seven Ingersoll-Rand 4-in. drills mounted on a main-line jumbo comprised the drilling unit. Standard jackbits were tried on this job but due to sharpening difficulties, were discarded for conventional steel. A hammer cut was used to pull the core. Progress in good ground averaged 36 ft per day. The work schedule called for two short rounds to be drilled, shot, and mucked out per shift.

The Utah Construction Co. drove the lower 11,500 ft of Electra Tunnel. When the headings were in hard Calaveras formation the contractor used the alternate heading method of driving. Daily progress for the combined headings averaged over 49 ft per day.

In good ground, using the single heading method of driving, contractors averaged 30 ft in each heading per day. A bonus system was used on these tunnels, with the miners and mucking crew participating. In untimbered ground 25¢ per ft was paid each worker for all footage beyond 180 ft per week, and in timbered ground, for all footage in excess of 90 ft per week.

Construction of the Cresta Tunnel is under contract to T. E. Connolly, Inc., San Francisco. In the Bear Creek Adit a main-line jumbo has been replaced by gantry-type structural-steel combination drill jumbo and "cherry picker." One jumbo is located in each heading and is pulled back from the face a distance of about 200 ft when blasting. An average advance of 25 ft per day, working three shifts, is constantly being maintained in a 26-ft diam horseshoe tunnel. For drilling, 3 in. automatic drifters with 30

in. shells working under 90-lb air pressure are mounted on the jumbo. An average of 120 holes, 10 ft in length, are drilled per round with 1½-in. Carset bits, on 1⅛-in. alloy steel shanks. About 200 ft of hole is drilled with one sharpening.

The upper or Rock Creek development consists of 35,000 ft of 25-ft horseshoe tunnel which will carry 3000 cu ft of water through twin 12-ft diam pipe lines to a powerhouse that will generate 147,000 hp under a head of 535 ft. The Walsh Construction Co. is driving 6700 lineal ft. In a section of medium hard granite, an average of 26 ft per day is being driven with 11 Gardner Denver 4-in. machines, with 4-ft guide shells. They are mounted on a gantry jumbo and drill the face—104 holes, 8 ft deep. Cut holes are 12 ft deep. Liddicoat throwaway bits are used, each bit good for about 4 ft of drilling. Two changes of steel are made for the rib and breast holes and three for the cuts. Starter drill bit size is 1⅞ in. and bottom, 1¾ in.

Drilling cycle is as follows:

Move in and set up	20 minutes
Drill (104 holes)	1 hour 30 minutes
Load and shoot	45 minutes
	2 hours 35 minutes

Mucking is done by a single 75-hp Conway shovel and 5-cu yd pressed steel dump cars. The contractor has on order a 100-hp mucker with a 1-cu yd bucket, with which he hopes to cut the mucking time considerably.

Mucking cycle is as follows:

Smoke time	30 minutes
Mucking fly rock	10 minutes
Load 40 cars	2 hours 20 minutes
	3 hours 0 minutes

Powder consumption, per round, 450 lb—3.75 lb per cu yd.

— Discussion —

By **A. H. Bebee,** Vice-President and General Manager
Golden Cycle Corp.

IMPORTANT findings were made in the driving of the 33,000-ft Carlton tunnel at Cripple Creek, Colo. Small drill holes were used with conventional steel and detachable bits as well. The average footage for the entire tunnel was 51.09 ft per day.

At the start of driving the tunnel, 2⅛-in. bits on conventional steel were in use. As tunneling progressed the size of the starters was reduced to 1⅞ in. Then the air pressure was raised to 132 lb which gave almost 125 lb at the machine. A change was made to 1⅞-in. bits and in many cases these were run clear to the bottom of the hole.

Water was a considerable problem. At 28,000 ft in from the portal a water flow of 20,000 gpm was encountered which was heavily charged with CO_2 and nitrogen gas.

Underground Shaker And Conveyor Belt Operation in a Lake Superior Iron Mine

By **Phillip D. Pearson,** Supt. and **Richard O. Marsten,** Asst. Supt.
Inland Steel Co.

This paper appeared in full in the October issue of MINING CONGRESS JOURNAL.

In the absence of the authors, this paper was presented by R. D. Satterly, General Superintendent, Inland Steel Co.

Open Pit and Placer Mining

W. C. **BROWNING,** Session Chairman

Adoption of Open-pit Mining at Three Arizona Properties

By **A. E. Millar,** Pit Development Supt.
Inspiration Consolidated Copper Co.

ONE of the recent interesting developments in the mining field has been the start of open-pit operations at the Bagdad Copper Corp., Inspiration Consolidated Copper Co., and the Ray Division of Kennecott Copper Corp. Open-pit mining was decided upon to recover sections of the already known ore reserves. At both Inspiration and Ray open-pit mining will supplement underground mining; however, at Bagdad, production will come from the pit only.

Recent improvements permit the mining of small areas. Improvement in power shovels, such as the full revolving shovel with tractor treads, provide greater flexibility, also truck haulage has advanced to such a point that steep grades can be negotiated. The main factor is the cost of mining and delivering ore to the plant. Unit costs for underground mining at all three properties have been and are considerably higher than open-pit estimated unit costs.

With the use of the mechanized equipment available today, the number of men required for a given tonnage is considerably less in open-pit mining than in underground.

	Tons per man shift Underground	Open-Pit
Bagdad	21	65 (will increase)
Inspiration	30	90
Kennecott-Ray	25	80-90 (estimated)

In all three instances the change to open-pit mining has resulted in a greater tonnage with a lower over-all grade of copper. In the three properties under discussion, the cutoff between ore and waste is 0.6 percent total copper; and it may be possible to go to 0.4 percent copper as an economic cutoff provided plant conditions and market price warrants.

When block caving was in use at Bagdad, heavy drawing caused funneling through to the surface which resulted not only in grade dilution but also in the drawing of oxide material detrimental to mill recovery. Open-pit operations permit segregation of the oxide and sulphide. The flexibility of pit work will enable tonnage increases as may be required by plant expansion.

Since 1930, leaching has accounted for practically all of Inspiration's output and control of grade and the relative proportions of sulphide and oxide is essential. Open-pit mining assists greatly in such control.

At Ray, underground mining of an ore body located west of an area already mined by caving would require, due to the dip of the ore body, maintaining several levels which in turn would add to an already high underground mining cost due to heavy ground.

Over-all slopes, shapes of areas involved, preliminary stripping required, waste to ore rations, grade cutoffs, etc., are of utmost importance and must be given careful consideration. Transportation is usually by rail, truck, or belt conveyors. Chief among the influencing factors are size of ore body, depth of ore body, length of haul, and how much grade is involved. It is usually desirable to keep the railroad grades to a maximum of 4 percent. To date, truck haulage has been limited to the available size of power units, at present a maximum of about 275 hp. There is a great field for the development of heavier Diesel equipment. Belt conveyors are useful, especially when removing ore over a grade exceeding 10 percent.

Open-pit operations at Bagdad were started in 1945, the ore being transferred from the surface through raises to the underground haulage level. Today all material from the pit, at a rate of 3000 tons daily, is being trucked to a crusher in the pit bottom and carried by conveyor to the plant. The crusher has a capacity of 3000 tons in 12 hours, crushing to 6-in. size. The conveyor in use at present is 1000 ft long and rises at an angle of 17½ deg. The material is handled on a 36-in. width belt. At present the cost of crushing and conveying approximates 3½¢ per ton.

Diamond drilling has added ore until today it is estimated that there are available for open-pit mining about 18,000,000 tons of ore of 0.9 percent copper. At present the mill can handle about 3000 tons per day, and plans are being made to add one additional ball mill to permit treatment of 4000 tons daily. Eventually, it is hoped to bring the capacity up to 10,000 tons per day.

At Inspiration the combined grade of open-pit ore together with underground will average about 1 percent total copper. One of the main problems involved was the question of how to deliver the ore to the plants. Trucking proved to be the most adaptable and economical method.

At the Ray Mines Division of the Kennecott Copper Corp. as most of the waste will contain some oxide it will be placed in areas where heap leaching can be practiced at a later date. The maximum length of waste haul will be a distance of approximately 1 mile. It is expected that the main body of ore will be encountered just below elevation 2100 and will continue to the bottom of the pit at elevation 1700. Roads for ore will be held to a maximum grade of 6 percent inside the pit and 4 percent outside of the pit limits.

Ray's present production is about 6000

tons per day and as soon as maximum production is possible from the pit it is planned to reduce underground tonnage, supplementing this with sufficient tonnage from the pit to make a combined production of 15,000 tons per day.

— *Discussion* —

By **W. H. Goodrich,** General Manager
Chino Mines Division
Kennecott Copper Corp.

WHY was open-pit mining not more extensively carried on 20-30 years ago? In those years steam shovels mounted on sections of railroad track were used for quarry mining. Gangs of six to ten laborers were required to keep the track in shape and move it forward and backward in order that the shovels could get to the muck. The development of trucks to a point of high efficiency together with modern loading equipment were large factors in making possible the extensive application of open-pit mining. Lower grade ores can be handled because of the numerous improvements in operating that have been brought about in recent years.

By **Ernest R. Dickie,** Manager
Bagdad Copper Corp.

A CONVEYOR belt is used at Bagdad because it is considerably cheaper to nstall to get the required tonnage than :o buy enough trucks to haul the ore. The conveyor only needed to be 1000 ft long, center to center, to convey the ore, and it was possible to run this conveyor on a 17½ deg grade, whereas with trucks, the ore would have had to be hauled approximately one-half mile to get it to the crushing plant. Then the ore would still have to be elevated to place it in the primary crusher. With the use of the conveyor the ore is conveyed right to the crushing plant without any further transfer.

Large Scale Stripping With Dragline—Conveyor Belt Combination

By **Earl S. Mollard,** Manager of Mines
Butler Brothers

This paper will appear in full in the December issue of MINING CONGRESS JOURNAL.

Gold Dredging Practice And Problems in California

By **H. A. Swain**
Yuba Consolidated Gold Fields

GOOD California practice is to dig with the maximum depth reached while the ladder is at 45 deg with the water level. Digging is started at the top of the bank and, as the bucket line moves upward, the dredge swings about the spud which is at the stern resting on the pond bottom. The spud takes the thrust of digging, distributing the load to the fore and aft trusses. Spring-mounted spud-keepers help in absorbing shocks and distributing the load evenly. The side swinging is accomplished by port and starboard bow lines that are carried from the underwater point of the digging ladder to shore blocks and back to the bow of the dredge on the forward deck, thence to the swing winch, usually mounted inside the deck house on the starboard side. Material dug is elevated to the main hopper and is sized in a revolving screen that discharges

H. A. Sawin

over-sized rock and gravel to a rubber stacker belt. Fines are passed through screen perforations to gold-saving tables equipped with Hungarian riffles. Dredges are "cleaned-up" weekly; amalgam and heavy sands are taken ashore for final treatment.

On a well-designed and operated dredge, mining clean placer gold which amalgamates freely, it is possible that losses are less than the cost of additional equipment and labor to save them. Modern practice includes the use of jigs of one type or another and they have been installed on several dredges, either used as a complete recovery system or in conjunction with tables and riffles. By 1913, bucket sizes had reached 13½ cu ft capacity on Yuba River dredges operated by Yuba Consolidated Gold Fields. Later, these were increased in capacity to 15 cu ft and then 18 cu ft each. Digging depths of 60 ft were once thought to be maximum, but now two dredges in California dig 112 ft and 124 ft below water level and against banks 50 ft high if necessary.

The first dredge in California, called the Phoenix, was on the Yuba River in 1850. This year marks the golden anniversary of successful dredging in California; 50 years of producing gold worth about $500,000,000 at today's price of $35.00. Half a billion is small change to some of our economists, but half a billion in gold is a stable, indestructible commodity.

Most of the problems of dredging are economic and political. A free market for new gold would correct many of the gold miners' problems that exist today; namely, high cost of labor, new equipment and maintenance material, freight, power and fuel, and many other items on the debit side of books.

Tailings and surface destruction are problems with which practically all mining operators must cope. Dredge tailings in California have a value for crushing. Millions of tons of crushed rock from dredge tailings are sold.

Since 1913 there has been a constant flow of criticism concerning destruction of farm land by dredges in California. Objectors concentrate their efforts to a great extent through farm organizations. Proposed bills regulating or prohibiting dredging have been tabled or failed of passage as legislature members are business-minded and have been fair judges of the merits of the gold-dredging industry. U. S. Census reports show that California has available an acreage of crop land standing idle that is equal to one-half the area of approximately 7,500,000 acres that is cropped. Dredging land area in the state is only a small fraction of one percent of the good crop land. Despite this fact, a few people still carry on the fight against dredging.

Dredge operators are aware of any restricting ordinances when planning a dredging program. It is one thing to conform with an existing ordinance but quite something else to have a county board of supervisors pass an ordinance with retroactive clauses that make it impossible for a dredge operator to carry out agreements. This has been attempted in several instances in California, but cases taken to court have resulted in findings favorable to the dredging interests.

R. L. Norris, Jr., in the *Sacramento Bee* expressed the thought that dredging aided preservation of the water table. Maybe dredges, loosening up these underground strata, enable them to recharge at a fast rate during the winter runoff.

During 1941, the dragline gold dredging industry of California produced about 225,000 oz of gold. Dragline dredging has not recovered its standing in California to the extent that has bucket-line dredging since the war. Values must be substantially higher than in dredging with medium and large size bucket-line dredges.

Gold mining has been of great importance for a long period of history. Public acceptance of gold by people everywhere, at prices which steadily increase in relation to paper currencies or other artificial moneys, is all the assurance anyone should need to remove doubts as to the value and utility of gold.

— *Discussion* —

By **R. P. Porter,** President
Porter Brothers Corp.

DREDGING interests might like to know some of the problems that have arisen and how they have been handled in Oregon and Montana. In Oregon for many years in each session of the Legislative Assembly a bill has been introduced to restrict dredging on all lands. These bills have been promoted and strongly backed by the Oregon State Grange, an organization that states its sole purpose is to protect agricultural land in the John Day Valley. However, proponents of the bills have stated that they will close dredging in the entire state in order to protect this one locality.

These bills have been prevented from passing by a compromise. Restrictive bills will be introduced again, but in the past, committees studying the question have given fair hearings on the matter.

The report that the Oregon section of the AIME recently made concluded: The dollar value for mining land where minerals are found is so much greater than the value for agricultural, grazing, or timbering purposes that it would be contrary to the general public welfare to prohibit mining in order to reserve the land for agricultural purposes. Gold dredging destroys no more land surface than many other types of surface mining. The mining industry to date has not destroyed more than the merest fraction of the amount destroyed each year by erosion, poor farming, overstocked grazing lands, reckless timber operations, and fire loss to standing timber.

Similar legislation has been proposed in Montana although the attacks on gold dredging have not been as vicious. There are few dredging operators in these states and the support and assistance of the entire dredging industry is necessary to handle the situation. If some of the proposed bills become law in many states of the land, the practice of gold dredging will be placed in archives of history along with Indian tomahawk and George Washington's axe.

By **C. G. Cooley,** Partner
Cooley Brothers

OUR experience has been confined entirely to dragline-type of gold dredging at three operations. In these operations production was around 100,000 cu yd per month. The dragline-type of operation is handicapped as dragline operators are paid more money than the operator of the bucket line and dredge. We find that it is almost impossible to maintain a reliable organization on a seasonable operation. Good men will not consider being off for two or three months as they did several years ago. Hence our operations are shut down and we are carrying on coal strip mining.

As far as I know there are three or four dragline-type dredges operating in the United States. Two are operating in Colorado. During the past two years there have been three dragline-type dredges shipped to French Guiana, and one to Europe this summer.

The future outlook for gold placer mining is in doubt. We have come to the conclusion there will have to be some change in the price of gold or cost of production before we can start up again.

Mine Operating Problems

WILLIAM J. COULTER, Session Chairman

Development, Sampling Procedure And Block Caving Tests in The Greater Butte Project

By **Chester H. Steele,** Mines Geologist
Anaconda Copper Mining Co.

MEMBERS of the Anaconda Copper Mining Co.'s geological and mining departments at numerous times in the past have given consideration to the possibility of block caving the entire horsetail ore and certain wide vein areas in the central east section of the district. Three supposed unsurmountable problems, the handling of large quantities of old timber from square-set stoping operations of the past; fire gas and potential fires in certain isolated sections; and doubtful ore grades, always caused postponement of thorough investigations.

Accurate geological data accumulated during the past 50 years of mining in Butte made it possible to determine the existence of the low grade ore bodies of the Greater Butte Project. Past mining was confined to the high grade horsetail ore streaks and concentrations of high grade stringers and disseminations leaving the intervening waste and numerous closely-spaced stopes filled with copper-bearing gob formerly considered waste. The Greater Butte Project plans are to remove large volumes of these remaining copper-bearing materials by low cost block caving. Although narrower than the horsetail areas, the largest wide vein zone is 100 to 200 ft wide, 1100 ft long, and extends vertically from the 200 to 1200 level.

Preliminary tonnage estimates indicated the existence of 12 possible block-caving zones with a total tonnage in excess of 100,000,000. Original estimates of grade were that this material contained at least 20 lb of recoverable copper a ton, with minor amounts of silver and gold.

Only by shipping large representative quantities through the Anaconda Copper Mining Co.'s Washoe Sampler could an accurate average assay grade be determined. Plans were made to obtain large representative quantities of material from the most important of the 12 possible block-caving zones by extending a crosscut along the center line at approximately right angles to horsetail stringers and old filled stopes. If block-caving type ore was found, parallel crosscuts would be located on each side, two-thirds of the distance from the center line to the supposed zone boundary. Assay returns from the first line of crosscuts were satisfactory; the other crosscuts were driven and even higher grade material was exposed.

The plans followed provided samples consisting of 94 percent of the total material excavated from each crosscut. Every effort was made to maintain uniform sized crosscuts. Hand-cut samples were taken by chipping the entire exposure along each side of each crosscut. Underground mine car samples were obtained by loaders scooping 1 lb of material from the top of each small mine car, or 5 lb from the top of each large car. Surface larry car samples were accumulated by an arrangement whereby material from the larry cars was split when dumped. The stockpile samples containing from 70 tons to 2700 tons were shipped separately in special-cleaned railroad cars through the Washoe Sampler, where each lot of three carloads or less was sampled separately and the results combined by weighting by dry tons.

The entire stockpile sample material, totaling 70,913 dry tons, was shipped to the Research Department at Anaconda, where it served as feed for a 500-ton concentrator unit. A comparison of the four types of sample assay averages showed hand-cut sample results were the lowest grade, larry car samples were the highest, and underground mine car and stockpile shipment sample averages were in between and checked reasonably well. Even if the lowest average is considered correct, 20 lb of recoverable copper is indicated as the content of these block-caving ore-bodies. At least 130,000,000 tons of minable ore is indicated above the 3400 level, 11.4 percent of the total by weight being gob and 88.6 percent solid.

To determine the "caveability" of Butte fractured, mineralized, granite containing old and new stope filling and timber; to determine the possible difficulties from large sized material choking chutes; and to indicate development and repair costs that might be expected, a decision was made to prepare and cave a block 100 by 136 ft in area. A site was selected at the east end of one of the smaller zones, Mountain View or No. 6. The haulage level was established 400 ft below the barren oxidized zone. The grizzly level was established at 52.5 ft above the bottom of the haulage crosscut and the undercut level at 18.0 ft above the grizzly. Chutes were established between the haulage level and the grizzly level, and finger raises from the grizzly to the undercut level.

Vertical boundary weakening consisted of a raise, size 4 by 4 ft by 21 ft high with enlargements on two sides 4 by 7 ft for 17 ft of the height. As undercutting was completed, production was held to a maximum of 1530 tons a day. A system of sampling was established. The 500-ton concentrator section was supplied with 40,847 tons of the total for further metallurgical tests.

Test Block No. 2 was started east of No. 1, with a pillar 10 ft wide between them. Caving production, including development, was 304,187 dry tons, averaging 1.09 percent copper, 0.32 oz silver, and .002 oz gold a ton compared to an estimated tonnage of 303,500 averaging 1.07 percent copper and 0.32 oz silver. The block caving tests showed: Butte ores of this type will cave readily and require little secondary breaking; prefilling will make development and maintenance much easier, thereby reducing costs; little or no boundary weakening will be required; small blocks with speedy development, undercutting, and drawing will reduce costs; draw-point spacing with centers 20 by 15 ft appear best suited for Butte ground; and grizzly spacing of 12 in.; 36-in. chutes; and 5-ton cars are about correct proportionately.

— *Discussion* —

By **Charles E. Schwab,** Mining Engineer
Bunker Hill & Sullivan Mining & Concentrating Co.

PROSPECTING and exploration to determine the feasibility of block caving a section of ore in the Bunker Hill mine began in March, 1946. There existed only a minor amount of available workings from which exploration could be started. Geological information was also lacking. Prospecting was done on four horizons. Two surface adits were driven, followed by crosscutting to determine the limits of the top of the ore body at the surface. One horizon was cut in the middle of the mineralized zone, and the No. 5 level was prospected. The limits of caveable ore above the No. 5 level have been determined and since it outcrops almost on the surface, it can be block caved without jeopardizing any other ore bodies or the probable extension of this one down to deeper levels. The distance from the No. 5 level to the surface averages about 300 ft vertically. The ore zone is 1000 ft long and 175 ft wide. The work to date has proved 5,000,000 tons of ore minable by block caving with a combined lead and zinc assay of better than 3 percent and about ½ oz silver.

Small high grade stringers from 1 ft wide down to almost hair-like fineness occur in the block of ground to be caved. The ore has four zones of weakness that make it adaptable for caving: bedding of quartzite, jointing of quartzite, a myriad of small faults not in the planes of bedding or jointing, and the ore veins and stringers.

All prospecting was done by crosscutting operations planned to provide a 6-8-ton sample from every 30-ton round. Each round was handled separately, loaded into cars, and one car out of every four was cut out of the train. Samples were trucked to the primary-crushing plant in Kellogg and crushed to —1½ in. after cleaning the circuit. A 100-lb

sample of the —1½ in. product was used to determine assay and for mill laboratory tests.

The Bunker Hill smelters and sampling plants were used to check this method of sampling. Duplicate 6-8-ton samples were finely ground and assay results determined. These have checked within the tolerance required.

Based on the results of this sampling and prospecting, plans for six blocks have been completed. The preparation of block one is about 70 percent completed.

Shaft-sinking in The Coeur D'Alene Mining District

By **R. W. Lottridge,** General Superintendent
Federal Mining & Smelting Co.
and
R. W. Neyman, General Mine Superintendent, Hecla Mining Co.

THE general trend of shaft-sinking, towards increased mechanization to obtain lower man-hour consumption, has become necessary because skilled mining labor has become less available and available labor is not only less efficient but more costly.

Mechanical shaft muckers, exemplified by the Riddell clamshell have not only increased sinking rates and helped lower unit costs, but they have made a substantially larger number of skilled miners willing to undertake shaft work. For mucking incline shafts, Bunker Hill has developed a machine that will be used in sinking an auxiliary shaft. The machine is a self-loading skip and it is anticipated that it will be good for 400-ft lifts.

H. W. Lottridge

Whenever ground conditions make it suitable, drilling is performed by power-feed drifters, mounted on a pneumatic bar. Hecla has developed a jumbo that has proved successful in sinking of the Star shaft. Utilization of two jumbos in separate compartments makes it possible to use as many as six machines in the bottom.

R. W. Neyman

The type of round used varies considerably over the district, but the bench round is favored in vertical shafts. Detachable bits are used in the district almost exclusively and tungsten-carbide bits will be tried out in new sinking programs. Powder used in the district varies considerably, both as to type and strength; electric primers are used exclusively.

The Cameron-type No. 3 or No. 5 sump pump is now in general use. It pumps to a tank, moved periodically down the shaft. Elimination of the tank may be pending—if a trial proves successful, Bunker Hill will pump directly from the sponge pump to a motor pump which will be installed in the main column, with booster pumps installed as necessary.

Costs, in general, even with improved methods, are higher than those encountered in prewar days. Notwithstanding a decrease in labor efficiency, man-hour consumption per foot of advance today is lower than ever before. This indicates the soundness of the trend to mechanize and simplify operations to a maximum degree.

In 1947-48 the Page shaft was sunk 385 ft below the 2400 level by hand mucking. The skip was converted to a bottom-dump type by putting a vertical sliding door on the end. Horns were welded on the sides of the door for opening it.

The Page shaft roughly parallels a vein structure and below the 2400 level, this crossed from the footwall to the hanging wall of the shaft. In this zone, the quartzite was brecciated, would not stand well, and had a tendency to run out from behind blocking. The sides of the shaft were laced tight—stringers or sheeting caps were placed on top of the regular shaft sets and cribbed cedar bulkheading was built up on these to catch the back which, of course, ran up above normal height. As the work progressed, sets were shortened from 5-ft centers to 2.5-ft centers and were carried against the bottom. Spiling was driven tight against the hanging wall from each set to prevent any slough or run from taking place. Only one-third of the men hired for the bottom had ever worked in a shaft before and 40 percent had had less than 2 years' experience underground.

The objective of the Galena shaft is 3000 ft, or approximately sea level, for exploration purposes It was decided to make it a four-compartment rectangular shaft. Two center compartments are for hoisting. The regular crew consists of 24 men as follows: a superintendent, 2 shift bosses, 12 shaft men (4 on a shift, one of whom is a pusher), 3 topmen, 3 hoistmen, 1 timberframer, 1 mechanic, and 1 surface laborer. A Riddell-type shaft mucker was used until the condition of the ground would no longer permit leaving dividers out and it became necessary to timber to the bottom. Guide shoes were installed on the mucker carriage so that if anything went wrong with the machine it could be hoisted to the surface without delay for repair, and also so that it could be hoisted clear of blasts.

The buckets are provided with a guide shoe on each side near the bottom. These are mounted on trunnions above the center of gravity of the shoe so that the shoe tends to hang in the running position when it is off the guide in the bottom. To assist the shoes in engaging the guides, the guides were tapered at the bottom. Guide shoes on the buckets prevent them from catching timber while being hoisted or lowered.

Trouble in the bottom due to exposure along the strike of the bedding was overcome by changing the section of the shaft from four in line to a square section. The transition from long section to square section was made in two sets. The ground was taken out for about the full length of the long shaft far enough into the North wall to accommodate the new sets. A collar set was laid on the bench thus formed, with the bearing timbers extending into the ends. A square set was built on this and from the outside top of this, timbers were angled back to catch the second shaft set up.

In framing the new square-section timber, what would be the center divider is now called the center plate. From the center of it to the center of the end plates are two dividers. As a precaution against end squeeze pinching the guides, a 2 by 12-in. cedar filler block is placed between the end plates and the outside guide. Since starting the new type of timber, the shaft has advanced approximately 300 ft without difficulty. The ground still takes its quick initial squeeze but the timber has moved little, the shaft is in good alignment, and it is thought that repairs can be made without cessation of sinking.

— *Discussion* —

By **Clark L. Wilson,** Mine Superintendent
New Park Mining Co.

SINKING operations in the main shaft of the Mayflower mine were recently completed utilizing the Boskovich Mucker. This mucker is a power-shovel dipper suspended below a mine cage. The cage has room for the operator, and the air hoists needed to operate the mechanism. The swinging motion of the dipper through a muck pile is provided by two air hoists, using cables strung over sheave wheels located at the ends of the shaft section. Crowding action is provided by an air piston mounted on a horizontal bar suspended below the cage. Horizontal motion of the piston across the short dimension of the shaft is provided by a third air hoist. The vertical position of the machine and cage is controlled by a fourth air hoist that permits the mucker to be hoisted in a shaft compartment.

A comparison of performance records before and after installation of the machine indicates an over-all increase from 0.16 to 0.28 of a foot advance per man-shift worked. Buckets mucked per man shift increased 70 percent. Man shifts required to install one shaft set decreased 23 percent.

Two inverted A frames keyed to the bottom of the cage support a piece of heavy shafting at right angles to the long dimension of the shaft. A piston bar with 5½-cu ft bucket pinned to the end swings around this shaft. The A frames may be moved to various horizontal positions beneath the cage. A spring latch locks the dump door which automatically closes as the bucket is returned to digging position. A pipe frame work at opposite ends of the shaft supports the sheaves over which run the cables that provide the digging action and return action of the mucking-machine dipper. A man seated on the cage operates the dipper back and forth through the muck pile using lever controls from two hoists and providing crowding action with a foot-operated valve that controls the piston.

Loading time per bucket varied with rock fragmentation. Four or five scoops of fine rock would fill a 21-cu ft bucket in one minute. A cycle of loading, hoisting 375 ft, dumping, and returning the bucket, average four minutes.

By **J. Murray Riddell,**
Head Department of Engineering
Michigan College of Mining and Technology

A SCARCITY of shaft labor and the increasing reluctance of labor to use a hand shovel has compelled industry to mechanize the operation as much as it is practical, feasible, and consistent with economy. In the development and adoption of any shaft-sinking mechanism, which plays only a part in the entire cycle of the operation, it is significant to note and to take into consideration the saving reflected into the other phases of the work which cannot be mechanized.

Any labor-saving device lessens physical and mental fatigue. Recently a six-compartment vertical shaft was deepened approximately 1000 ft. During the first half of the sinking operation, conventional trays were used for mucking, and in the latter half the mucking was mechanized. The use of the mechanized mucking apparatus resulted in the comparative decrease of 43.25 percent of the total man hours of direct shaft labor consumed per foot of shaft sunk. However, of that saving, the mechanized mucking apparatus can directly lay claim to only 73 percent of it, as there was a speed up in the other parts of the work, due presumably to a strength reserve of those performing it.

The bench cut is less destructive to shaft sets than the full-cut round. The type of round to be drilled, the depth of cut used, and other factors will remain controversial, but the "pay-off" goes to the fellow who can hit optimum point.

In Mr. Riddell's absence, this paper was presented by T. S. Veazey, Jr., Assistant Research Engineer, Anaconda Copper Mining Co.

Exploration And Development of The San Manuel Ore Body

By **Wesley P. Goss,** General Manager
Magma Copper Co.

IN September, 1945, Magma exercised its options and formed the San Manuel Copper Corp. to carry on exploration and development of the property. The coordinate system for drilling started by the Bureau of Mines was adopted and extended. The Bureau of Mines drilled 17 holes having a total of 15,844 ft; San Manuel deepened several of these holes and put down 88 new holes, drilling a total of 180,922 ft. The full extent of the ore body is not yet known because, having developed 460,000,000 tons, we stopped drilling.

Two shafts will be needed to hoist the anticipated production of 25,000 to 30,000 tons per day. The first shaft has been started and is being sunk as a permanent shaft that will be capable of handling up to 15,000 tons of ore per day. The second shaft will be sunk in the ore body. If we do not encounter excessive water we will be into the ore and obtaining needed information in a short time.

We have constructed a power plant containing three 1000 kw generators driven by gas Diesel engines, and two air compressors. A machine shop, steel shop, hoist house, warehouse, change room, and office are either finished or nearly so. We have constructed 21 three, four and five-room dwellings, two 24-bed dormitories and a mess hall. A concentrating plant will be built as near to the ore body as property and topographic limitations will allow. A smelter may or may not be built depending upon economic considerations. A new town of 5000-6000 population will come into being.

We expect to be able to develop caving blocks or panels 700 ft long, 160 ft wide, and 600 ft high where the thickness of the ore will allow. Few blocks of this height have been caved and drawn before. Plans for development will be made flexible so that the height of the block can be reduced or increased if early experience indicates a change desirable. The opportunity is present for making this the most efficient block caving operation in existence.

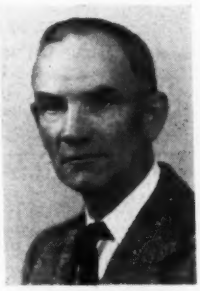
This paper will appear in full in the December issue of MINING CONGRESS JOURNAL.

— *Session Chairmen* —

HOWARD I. YOUNG
President
American Zinc, Lead & Smelting Co.

R. M. HARDY
President
Sunshine Mining Co.

JOHN F. MYERS
Mill Superintendent
Tennessee Copper Co.



F. M. JARDINE
Mill Superintendent
Nevada Mines Division
Kennecott Copper Corp.

DONALD H. McLAUGHLIN
President
Homestake Mining Co.

R. J. MECHIN
Manager, Edwards Division
St. Joseph Lead Co.

J. C. KINNEAR
Vice-President
Kennecott Copper Corp.

W. C. BROWNING
General Manager
Golden Queen Mining Co.

HENRY B. FERNALD
Chairman, Tax Committee
American Mining Congress

LOUIS WARE
President
International Minerals and Chemical Corp.

WM. J. COULTER
General Manager
Climax Molybdenum Co.

IRA B. JORALEMON
Consulting Engineer
San Francisco

Coal Mine Power Costs

A Survey of Coal Operations in the Southern Appalachian Field, with an Annual Production of 61,500,000 Tons, Gives an Accurate Cross Section of Power Use and Costs in Bituminous Mining

By G. B. SOUTHWARD
Mechanization Engineer
American Mining Congress

EACH year as coal mines continue to use more machines in progressing toward complete mechanization, the underground power systems become of greater importance. Needless to say, the adoption of mechanization raised new problems. But the men in the electrical departments of mining and manufacturing companies have kept pace with the growth of mechanization and the greater amounts of power used have been accompanied by a corresponding rise in the efficiency of operating practice. Better quality, better design, and improved methods of installation have been notable. The net result has been to eliminate power wastes, so that the rising curve of electrical power used in coal mining and its cost has lagged far below the rising curve of mechanical production. That is to say, while the growth of machines in coal mining has raised the tonnage mined mechanically several fold in the last decade, the power used per ton and the cost per ton has shown relatively slight increases.

All the foregoing statements are capable of proof, and although detailed statistics for the entire bituminous industry are not available, we do have accurate records on a large group of mines in the southern Appalachian field. This group includes 179 coal operations in Virginia, West Virginia, and eastern Kentucky that produced 61,500,000 tons during the year 1947. This production, as well as the variety of seam and operating conditions encountered, is such that their experience may be considered as reasonably representative of the bituminous industry as a whole.

Analysis of Power Costs

These mines are covered by surveys of the West Virginia Engineering Co., whose 1947 report has recently been issued. Through the courtesy of H. P. Musser, president, their reports over the past years have been made available and are the basis for the figures submitted with this article. Before examining the figures in detail, we first present Mr. Musser's discussion of the trends that the survey indicates.

"There are encouraging signs of improved operating performances during 1947. Reversing a trend of several prior years, all classes of mines during 1947 used less substation capacity to produce the output. Since there were fewer prolonged interruptions to work by strikes, many mines increased their tonnage output without enlarging their substation capacity. The

Table I

POWER COSTS OF COAL MINES—AVERAGES FOR TWELVE YEARS 1936-1947

Year	Number of Mines	Average Monthly Tonnage	Substation Capacity kw	Average Monthly Kwhr. Purchased	Total Cost per Kwhr. (Cents)	Kwhr. Per Ton Coal	Power Cost per Ton Coal (Cents)
MONTHLY TONNAGE CLASS—10,000 TO 20,000 TONS							
1936	40	14,314	299	74,674	1.81	5.22	9.44
1937	45	14,474	311	78,446	1.74	5.42	9.43
1938	49	14,695	394	92,659	1.71	6.31	10.75
1939	48	13,760	348	80,880	1.68	5.88	9.87
1940	41	14,433	325	79,136	1.71	5.48	9.37
1941	50	14,955	309	79,331	1.56	5.30	8.30
1942	44	15,374	327	94,307	1.54	6.13	9.42
1943	48	15.067	334	88,799	1.57	5.89	9.23
1944	44	14,432	345	89,743	1.58	6.22	9.83
1945	43	14,443	370	85,923	1.68	5.97	9.49
1946	55	14,600	397	94,618	1.50	6.48	9.74
1947	48	14,568	393	99,781	1.53	6.85	10.49
MONTHLY TONNAGE CLASS—20,000 TO 30,000 TONS							
1936	34	24,706	443	128,514	1.63	5.20	8.48
1937	27	24,954	464	135,164	1.55	5.42	8.40
1938	30	23,870	528	139,917	1.58	5.86	9.25
1939	28	24,565	480	134,134	1.46	5.46	7.99
1940	33	24,946	475	140,145	1.46	5.62	8.19
1941	27	24,945	494	144,863	1.41	5.81	8.19
1942	35	23,915	448	132,718	1.48	5.55	8.22
1943	32	24,465	461	144,159	1.43	5.89	8.43
1944	35	24,578	467	146,831	1.46	5.97	8.64
1945	36	24,585	517	153,055	1.51	6.31	9.14
1946	34	24,838	603	164,187	1.44	6.61	9.51
1947	35	24.649	526	148,860	1.44	6.03	8.71
MONTHLY TONNAGE CLASS—30,000 TO 60,000 TONS							
1936	26	39,339	608	168,634	1.54	4.62	7.09
1937	32	39,607	661	196,477	1.46	4.96	7.22
1938	17	36,857	716	200,695	1.45	5.45	7.91
1939	26	40,231	769	210,402	1.41	5.23	7.39
1940	26	42,340	732	234,603	1.37	5.54	7.60
1941	27	42,130	736	232,853	1.34	5.53	7.38
1942	39	41,151	718	233,560	1.35	5.68	7.65
1943	30	38,373	685	226,363	1.40	5.90	8.23
1944	33	38,035	643	217,218	1.39	5.71	7.94
1945	26	38,774	796	255,587	1.42	6.57	9.34
1946	20	41,824	928	280,711	1.35	6.71	9.03
1947	34	40,129	840	273,174	1.37	6.80	9.35
MONTHLY TONNAGE CLASS—OVER 60,000 TONS							
1936	5	75,801	1120	306,966	1.44	4.05	5.82
1937	5	90,546	1277	489,048	1.20	5.40	6.47
1938	5	88,282	1382	594,076	1.15	6.73	7.73
1939	5	86,825	1070	541,730	1.10	6.24	6.87
1940	12	90,090	1417	512,358	1.17	5.69	6.63
1941	11	86,017	1412	592,332	1.11	6.89	7.65
1942	11	74,649	1171	459,215	1.19	6.15	7.30
1943	14	80,440	1250	485,859	1.21	6.04	7.30
1944	15	84,557	1420	515,405	1.21	6.10	7.37
1945	15	80,935	1593	543,479	1.22	6.87	8.25
1946	14	80,408	1786	557,572	1.15	6.93	7.96
1947	17	99,971	1856	644,103	1.17	6.44	7.52

substations were either loaded up, carrying higher demands, or operated usefully for a greater proportion of time.

"Neither kilowatt demands, nor kwhr used, showed any marked tendency to increase as had been reported in 1946, but averaged about the same as for prior years. This fact indicates efficient operating performances, since a larger proportion of coal is mined mechanically each succeeding year. The 1945 analysis showed 51 mines producing coal entirely by hand loading. This number dropped in 1946 to 40; and again there is a drop in 1947, to 33.

"The cost of energy and total cost of electricity increased slightly, due to coal clauses raising power costs. This increase was small in comparison with increased costs of labor and supplies. Those classes of mines increasing production also used more power and the natural effect of increased purchases is lowered unit costs; but four classes showed higher costs. Except for the coal clauses, it is likely all classes would have shown lower unit power costs.

"Load factors based on demand show no marked change from results of the past several years. Three classes in the monthly tonnage groupings show higher load factors, and three show lower. Differences are small in all cases. Small mines purchase power at load factors of about 25 percent, whereas large mines maintain load factors nearly double this figure. Load factor based on connected horsepower is higher for all classes, indicating that the equipment available was used for more hours in mining operations. This shows more efficient use of equipment and is definitely confirmed by the increase in tons produced per AC-HP in motors.

"The amount of electricity required to mine a ton of coal has not changed perceptibly during 1947. The least average used by a class was 6.03 kwhr per ton and the highest used was 7.93 kwhr per ton. Since the kwhr per ton was about the same as for prior years, but cost of electricity had advanced slightly, the result was increased cost per ton for power. Groups of mines making small electrical purchases paid an average of 15.48¢ per ton for power, while large mines as a class purchased electricity for less than half this amount, or 7.52¢ per ton.

"Two indicators show improved efficiency in use of equipment. The DC and AC connected load per kilowatt of demand has become less in practically all classes. Equipment is being loaded up and used to a greater extent. Machinery is not standing idle. This is further confirmed by the fact that more tons of coal were produced per HP of AC motors connected, in five out of the six classes. This shows more efficient operation, and the use of equipment over more hours of the working day."

Averages for 12 Years

The complete report of the West Virginia Engineering Co. is quite voluminous, including all of the major items connected with the use of underground power. Copies of this are available to our members upon request, but lacking space for the complete report in this publication, we submit in Table I averages of some of the power items over the past twelve years. Although it is true that average figures do not explain operating details, they nevertheless do indicate general trends.

In order to have a more complete understanding of the figures in this survey, the following explanations and tabulations are submitted to show the general seam and mining conditions in this field.

Production

The total production of the 179 mines covered in the complete survey is 61,500,000 tons per year. The individual units range from less than 2000 tons to more than 100,000 tons per month, but the statistics in this article eliminate 42 small producers that mine less than 10,000 tons per month. The remaining 134 mines, each producing more than 10,000 tons per month, had a combined annual output of 55,500,000 tons in 1947. This is slightly more than 90 percent of the tonnage from all mines in the survey, so an analysis of this particular group should be fairly indicative. As is normal for the country as a whole, the larger units though less in number, produce the greater tonnage. As shown in Table II, slightly more than one-third of the 134 mines (those in the plus 30,000 classes) produce two-thirds of the total tonnage of the group.

Mechanized Loading

The survey does not show the exact tonnage loaded mechanically, but it does show which mines are mechanized and to what degree. This enables us to make certain classifications and Table III makes a division of four groups to indicate the extent to which the mines have become mechanized. These classifications are: (1) mines with all hand loading; (2) experimental mines in which mechanical loading produces less than 25 percent of the output; (3) mechanizing mines with from 25 to 90 percent mechanical loading which are obviously planning

Table II

CLASSIFICATION BY TONNAGE PRODUCED

Monthly Tonnage Class	Number of Mines	Percent of Total	Annual Production	Percent of Total
10—20,000	48	35.8%	8,400,000	15.1%
20—30,000	35	26.1%	10,300,000	18.5%
30—60,000	34	25.4%	16,400,000	29.5%
60,000	17	12.7%	20,400,000	36.9%
	134	100.0%	55,500,000	100.0%

Table III

EXTENT OF MECHANICAL LOADING

	Number of Mines	Tonnage	Percent of Total
All hand loading	17	4,700,000	8.4%
Experimental—25% mechanized	14	6,000,000	10.8%
Mechanizing—25-90% mechanized	48	25,400,000	45.9%
Mechanized—plus 90% mechanized	55	19,400,000	34.9%
	134	55,500,000	100.0%

Table IV

POWER USED IN HAND AND MECHANICAL LOADING

	Annual Tonnage	Annual Power	Kwhr Per Ton
All hand loading	4,700,000	31,400,000 kwhr	6.7 kwhr
Experimental—25% mechanized	6,000,000	41,700,000 kwhr	6.9 kwhr
Mechanizing—25-90% mechanized	25,400,000	173,500,000 kwhr	6.8 kwhr
Mechanized—plus 90% mechanized	19,400,000	116,200,000 kwhr	6.0 kwhr
	55,500,000	362,800,000 kwhr	6.5 kwhr

complete mechanization; and (4) mechanized mines in which more than 90 percent of the output is loaded mechanically.

In connection with the methods of loading, the type of gathering haulage may be of interest. This is as follows:

Locomotives only	69 mines
Conveyors only	14 mines
Combination	50 mines
Hand pushing	1 mine
	134 mines

Seam Heights

The 134 mines covered by this survey are predominantly in medium thin seams and classifying them into three general divisions of high, medium, and low coal shows the following:

High Coal—13 mines—10 percent of the total number—operate in seams greater than 5 ft, producing 11,000,000 tons annually, or 20 percent of the production of entire group.

Medium—24 mines—18 percent of the total number—operate in seams between 4 and 5 ft high, producing 10,250,000 tons annually, or 18 percent of the production of the entire group.

Low Coal—97 mines—72 percent of the total number—operate in seams lower than 4 ft, producing 34,500,000 tons annually, or 62 percent of the production of the entire group. Only two of these mines are in coal less than 3 ft.

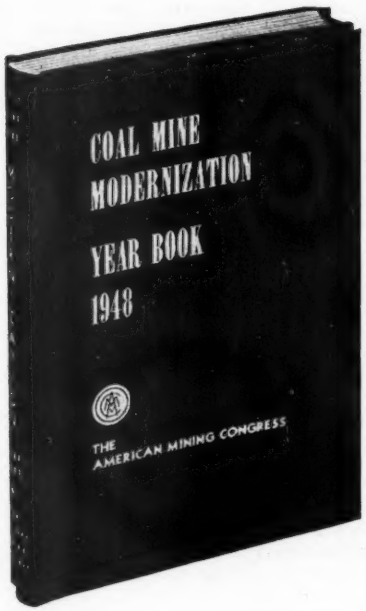
Power Used

All the foregoing discussion has been for the purpose of giving an over-all picture of the operating and mining conditions of this group. Since the survey deals primarily with the amount of power used, one final tabulation may perhaps be in order. This is given in Table IV and shows the relation between mechanization, tonnage mined, and power used. The last column showing the kwhr per ton is somewhat surprising and an explanation of these figures cannot be made without a detailed knowledge of the individual units in each group.

However, dealing only with the averages, it seems quite evident that less power per ton of coal is used for mechanical mining than with hand mining, and no doubt there are several contributing reasons when considering the group as a whole. One may be that mechanized loading is concentrated as compared to hand loading which reduces the gathering haulage distance and the amount of current used. Then there is another factor. Distribution systems for hand mining are not highly efficient and power losses are apt to occur; mechanized mining must have adequate voltage at the working face, and this requirement calls for better installations with corresponding reductions in power losses.

Only a few left....

ORDER YOUR COPY NOW



. . . all the proceedings of the 1948 Coal Convention covering the latest developments in operating methods and equipment.

Here's what one prominent mining leader says:

". . . I find that it contains a wealth of information of interest to anyone connected with coal mining. Furthermore, much of the material could be read to advantage by mining people in general, particularly those papers dealing with conveyors, underground and surface haulage, loading with shovels and draglines, and mine waste disposal.

"The above comments lead me to make another, to the effect that more inter-change of ideas between coal miners and metal miners is desirable. I find that metal miners are inclined to overlook the vast field of information which might be made available to them through a study of modern coal mining methods."

It's worth much more than the price—$3.00

(10 or more copies—$2.75 each)

1948 COAL MINE MODERNIZATION YEARBOOK

Published by

AMERICAN MINING CONGRESS, 1102 Ring Bldg., Washington 6, D. C.

WHEELS OF GOVERNMENT

As Viewed by A. W. DICKINSON of the American Mining Congress

A NEW House and Senate must be organized in January as the result of the national elections which gave the Democrats a 54 to 42 working majority in the Senate and a possible 263 to 171 in the House. It is probable that Senator Scott W. Lucas of Illinois will succeed vice president elect Barkley as majority leader, although mention has been made of Senator Joseph C. O'Mahoney of Wyoming and Senator Millard E. Tydings of Maryland for this post. As matters stand, Senator Walter George of Georgia will be Chairman of the Finance Committee, Elbert D. Thomas of Utah of the Labor Committee, Robert F. Wagner of New York or Burnet R. Maybank of South Carolina of Banking and Currency Committee, O'Mahoney of Wyoming of Public Lands Committee, Edwin C. Johnson of Colorado of Interstate and Foreign Commerce, Tydings of Maryland of Armed Services, and Kenneth McKellar of Tennessee of Appropriations.

Representative Sam Rayburn of Texas is expected to resume his place as Speaker of the House, with John W. McCormack of Massachusetts as Majority Floor leader. While the filling of all these places is subject to the action of the majority caucuses, Representative Robert L. Doughton of North Carolina is expected to be Chairman of the Committee on Ways and Means, John Lesinski of Michigan to be Chairman of Education and Labor, Brent Spence of Kentucky of Banking and Currency, Andrew L. Somers of New York of Public Lands, Carl Vinson of Georgia of Armed Services, and Clarence Cannon of Missouri of Appropriations.

The strong endorsement given President Truman in the election has added real strength to his arm in handling his Administration and his relations with the incoming Senate and House.

Steel Allocation

At the meeting October 26 between Commerce and Interior Department officials and the Commerce Department's Steel Products Industry Advisory Committee, the Committee took under advisement the proposals for 31,000 tons of steel monthly for maintenance, repairs and operation of bituminous coal mines and 47,800 tons monthly for production of mining machinery for coal, metal and nonmetallic mines. Task Committees for bituminous coal mining and mining machinery manufacture are assembling information and data requested and Department of Interior officials and representatives of the Office of Industry Cooperation (Department of Commerce) will continue to emphasize in current discussions the importance of the mining industry—coal, metals and nonmetallic minerals — and of mining machinery, as a basic industry essential to defense. At present, replies being received by the American Mining Congress, on behalf of its Manufacturers Division, to inquiries recently made, state that production of machines and equipment is suffering serious delay because of slow deliveries on dimensions, shapes and qualities of steel needed.

Included in the "Declaration of Policy" of the AMC Convention September 23 is the following:

"Without adequate supplies of steel for the manufacture of mining machinery and repair parts and for maintenance, repairs and operating supplies at mines and smelters, the mining industry cannot produce the metals, minerals and fuels essential to our economy and to national defense. Increasing difficulties in obtaining needed steel supplies are jeopardizing the production of basic raw materials from our mines.

"We commend the work of the Department of the Interior and its Advisory Councils in determining the amounts of steel required for mining use, and urge the prompt establishment by the Department of Commerce of a voluntary allocation program under which the necessary steel will be assured for the manufacture of mining machinery and repair parts and for the operations of the mining and smelting industry."

Basing Point

The 46-man Advisory Council to the Capehart (Rep., Ind.) Special Senate Committee investigating the effects of the Supreme Court basing point decision concluded its closed hearings in Chicago, October 21. The Council's recommendations are to be in the hands of the Committee by January.

Industrial leaders are calling upon the Committee to clarify the language of the Sherman and Clayton Acts, Federal Trade Commission Act and Robinson-Patman Act. Suggestions include: (1) that the Federal Trade Commission be prevented from finding a conspiracy merely on evidence show-

Washington Highlights

ELECTION: Democratic majority strengthens Administration's hand.

STEEL: Data prepared for allocation to mining.

BASING POINT: Hearings November 9.

STOCKPILING: Buy metals through normal channels.

DEFENSE: 5-point program.

MINERALS COUNCIL: Exploration and Development.

TAX: AMC Committee meets.

TRADE AGREEMENTS: New Tariff Commission rules.

FREIGHT RATES: I.C.C. hearings November 30.

LABOR: NLRBoard rulings.

ing identity of prices; (2) that freight absorption be legalized by Congress even where it is practiced systematically to meet competition; and (3) that the FTC definition of price under the Robinson-Patman Act be corrected to legalize delivered prices under which the mill net would be permitted to vary in accordance with the amount of freight that is absorbed.

Present plans are for the Senate Committee to open hearings November 9.

Metals Stockpiling

The conferences between Commerce Department officials and the producers of copper, lead and zinc, held October 12, 19 and 20, respectively, brought the definite expression from the producers that stockpile requirements can best be negotiated on an individual company basis by the Bureau of Federal Supply through the normal trade channels. A further meeting with the lead producers is scheduled for November 10 to allow of a more detailed study of production potentialities.

Particularly in the case of the copper producers it was pointed out that the Government had not made a thorough-going effort to get copper by usual purchase methods. The Munitions Board plans to acquire 90,000 tons of copper for delivery prior to June 30, 1949, in addition to the amount previously purchased. The tonnage of lead and zinc desired by the Government by June 30, 1949, was not made public although it is known that the Federal Bureau of Supply was in the market for 16,000 tons of lead for the third quarter of the current year.

National Defense

Under consideration by Chairman Arthur M. Hill and his National Security Resources Board is a program which would become effective in the event of a war emergency and would include: Manpower mobilization controls to avoid disruptive turn-over of labor and migration of workers; development of economic controls and fiscal policies to ward off inflationary pressure; conversion and allocation of industrial facilities including plans for letting of contracts; development of a machine tool program to avert industrial production bottlenecks, and development of controls over strategic materials, transportation, fuel and power use.

Now being drafted by NSRB is an omnibus mobilization and war powers bill reported to contain an industrial and manpower mobilization program, rationing of scarce commodities, wage ceilings and other mobilization controls. The President could submit such a measure to Congress and ask for its enactment as a "stand-by" law, or its presentation could be deferred pending any National emergency.

The following men concerned with minerals programs are now on the staff of the Board: Major General C. F. Robinson, Executive Officer; Arthur W. Carpenter, Assistant Director, Raw Materials; George E. Felton, Director, Office of Production; Charles L. Farris, Director, Bureau of Field Operations, Office of Production; John D. Morgan, Consultant, Raw Materials, Office of Production; John J. Croston, Director, Nonferrious Metals Division, Office of Production; Fred Rockwell, Deputy Director, Nonmetallic Minerals Division, Office of Production; W. F. Hahman, Director, Solid Fuels Division, Office of Production, and Frank Crockard, Deputy Director, Steel Division, Office of Production.

Minerals Advisory Council

The National Minerals Advisory Council has transmitted to Interior Secretary Krug three resolutions which were adopted at the Council meeting in San Francisco, September 24.

The resolution on exploration and development incentives calls for increased metal and minerals exploration in the public interest. Expressing the belief that this can be accomplished by the mining industry under free enterprise, the resolution declares that increased exploration and development can best be stimulated by an equitable revision of the tax laws, and by maintenance of adequate tariffs, insured against arbitrary reduction by an administrative agency. "However," the resolution states, "if Government financial aid for exploration and development is found necessary in the interest of national defense, we recommend its consideration." It is also emphasized that any steps which the Selective Service authorities can take towards exempting miners from the draft, would at least help prevent a decrease in the amount of exploration and development work accomplished.

A second resolution recommends that immediate steps be taken to complete the development of known beneficiation processes for chrome ores so that domestic reserves may be used in an emergency. Included is a recommendation that at least $100,000 annually, in addition to funds already available, be expended for the construction of small scale (one or two tons per day) pilot plants for the electrolytic and chemical beneficiation of domestic chrome ores.

The Council also endorsed the continuation of the Leadville drainage tunnel in Lake County, Colo., stating that this project offers one of the most helpful means whereby significant additions may be made to the domestic reserve of lead ore in the near future.

Tax

In a recent interview Senator George (Dem., Ga.), who is slated to resume the Chairmanship of the Finance Committee, stated that he does not look for any tax reduction in 1949. Incoming Chairman Robert Doughton (Dem., N. C.) of the House Committee on Ways and Means has made no statement to date, but his views usually coincide with those of Senator George. There is, of course, revived talk of an excess profits tax.

A meeting of the American Mining Congress Tax Committee under Chairman H. B. Fernald is scheduled for November 8 to review discussions held by a small Task Group of the Committee on October 26 with Chief of Staff Stam of the Joint Committee on Internal Revenue Taxation. At the San Francisco Convention special attention was given to the subject of mining taxation, the general view being expressed that present tax laws and their administration are one of the major deterrents to mining exploration and development and the investment of risk capital in mining enterprise.

Trade Agreement Regulations

The U. S. Tariff Commission has issued a revision of its "Rules of Practice and Procedure" in conformance with the Trade Agreements Extension Act of 1948. Under the new Act the Commission is directed to conduct investigations with respect to each article listed by the President for trade agreement negotiation, with a view to determining the possibility of injury to domestic industry if a tariff concession should be granted.

The Rules provide for public notice of investigation and hearings in connection with the Commission's determination of the minimum duty that can be established without threat of serious injury to domestic industry. Public hearings are to be held 30 days after notice of investigation, and interested persons may present their case orally or submit information and views in writing; briefs may be filed not later than 10 days after the close of the hearings giving a summary of pertinent points.

An interesting sidelight is the ECA announcement of the allocation of $3,000,000 for rehabilitation of tin, tungsten and antimony mines in China.

Freight Rates

The railroads have now petitioned the I.C.C. for a general freight rate increase averaging 13 percent, with a companion petition seeking authority to increase rates by 8 percent upon one day's notice. The I.C.C. has re-

(*Continued on page* 108)

1949 Coal Show Under Way

THE Program Committee for the 1949 Coal Convention and Exposition met at the Duquesne Club in Pittsburgh on November 10 and is now actively engaged in completing arrangements for the Convention sessions. Under the chairmanship of L. Ebersole Gaines, President, The New River Company, the Committee represents all fields and branches of the coal mining and manufacturing industry—giving full assurance that the coming meeting will equal if not surpass the fine Conventions of past years. Widespread interest among coal mining men throughout the country is indicated by the numerous suggestions received as to convention papers and speakers. In meeting, the Committee carefully reviewed all suggestions and is now completing a Convention program which will include subjects of widest possible application and general interest. Full details will be carried in subsequent issues of MINING CONGRESS JOURNAL and in direct mail announcements to the industry.

As previously announced, the 1949 meeting will be a full-scale Coal Convention and Exposition, the second of the postwar period, and will be held May 9-12 at the Public Auditorium in Cleveland, Ohio. Demand for exhibit space is extremely heavy and all indications point to a record-breaking Coal Show, with some 200 leading manufacturers taking part. Many of the previous exhibitors are planning enlarged exhibits and there will be more than a score of newcomers. The displays will feature a wide range of new and improved machines, equipment and supply items for every phase of coal production and preparation. The Exposition will be convincing evidence of the manufacturers' close cooperation with operators in meeting the challenge posed by increasing costs and the competition of other fuels, as well as by the urge for better and safer working conditions in the mines.

Operators thronged the registration desks at the 1947 Coal Show.

Cleveland hotels offer excellent facilities for the record-breaking crowd expected at the Coal Show, and all those planning to attend should be able to secure satisfactory accommodations. All reservations are being handled through a central housing bureau, and the first allocation of accommodations will be made early in December. Requests for rooms should be sent in promptly with full information as to arrival date and type of accommodations preferred, to Louise D. Perkins, Director, Cleveland Housing Bureau, 511 Terminal Tower, Cleveland 13, Ohio.

Program Committee

L. EBERSOLE GAINES
National Chairman
President, The New River Co.

R. L. ADAMS, Vice Pres., Old Ben Coal Corp.
E. F. ARMINGTON, The Euclid Road Machinery Co.
C. V. BECK, Pres., Clarence V. Beck & Co., Inc.
H. V. BROWN, Vice Pres., Brown-Fayro Co.
E. J. BURNELL, Vice Pres., Link-Belt Co.
T. C. CHEASLEY, Sinclair Coal Co.
H. J. CONNOLLY, Pres., Pennsylvania Coal Co.
W. H. COOKE, Pres., Little Sister Coal Corp.
JOHN P. COURTRIGHT, Vice Pres., Marion Power Shovel Co.
S. J. CRAIGHEAD, Vice Pres., U. S. Fuel Co.
J. H. FULFORD, Vice Pres., Jeffrey Mfg. Co.
WM. E. GOODMAN, Pres., Goodman Mfg. Co.
J. L. HAMILTON, Mgr., Northern Coal Mines, Republic Steel Corp.
GEORGE C. HOLTON, Asst. to Gen. Mgr., Explosive Dept., American Cyanamid Co.
DAVID INGLE, JR., Pres., Ingle Coal Co.
E. H. JENKS, Mng. Engr., Hanna Coal Co.
A. S. KNOIZEN, Exec. Vice Pres., Joy Mfg. Co.
FRANK F. KOLBE, Pres., United Electric Coal Cos.
STEPHEN KRICKOVIC, Chf. Engr., Eastern Gas & Fuel Associates.
S. S. LANIER, JR., Pres., Norton Coal Mining Co.
HARRY LaVIERS, Vice Pres., South East Coal Co.
CHARLES E. LAWALL, Asst. Vice Pres., Chesapeake & Ohio Rwy.
CARL LEE, Chf. Engr., Peabody Coal Co.
H. B. LEE, Vice Pres., Maumee Collieries Co.
R. C. LUTHER, Vice Pres., Peerless Coal & Coke Co.
T. F. McCARTHY, Vice Pres., Clearfield Bituminous Coal Corp.
D. L. McELROY, Vice Pres., Pittsburgh Consolidation Coal Co.
H. W. MEADOR, Vice Pres., Stonega Coke & Coal Co.
C. R. NAILLER, Vice Pres., Pittsburgh Consolidation Coal Co.
J. T. RYAN, JR., Exec. Vice Pres., Mine Safety Appliances Co.
LEONARD SARGENT, Vice Pres., Fairmont Machinery Co.
FRED O. SEE, Vice Pres., Mining Div., Cardox Corp.
F. G. SMITH, Asst. to Pres., Sunday Creek Coal Co.
R. H. SWALLOW, Chf. Engr., Ayrshire Collieries Corp.
H. H. TAYLOR, JR., Pres., Franklin County Coal Corp.
L. N. THOMAS, Pres., Carbon Fuel Co.
W. A. WIRENE, Mgr., Industrial Material Div., General Electric Co.
T. R. WORKMAN, Vice Pres., West Virginia Coal & Coke Corp.

Photogeology

(*Continued from page* 42)

tage by the geologist in locating test borings and pits most efficiently, thus assuring the operator a maximum return on his investment in preliminary exploratory work.

Numerous Engineering Advantages

Aerial photographs may be used by the mine operator for many purposes other than photogeology. It has been pointed out that accurate topographic maps may be prepared from them. Property lines, houses, roads, and other culture are visually recorded on the photos. All of these features may be recorded on the aerial photographs in true relationship to the beds being exploited. Their use can greatly facilitate the layout of mine access roads and drainage. The wide-scale use of aerial surveys today in all types of construction engineering is sufficient evidence of the value of air photos in sound engineering practice.

Ultimate Returns

An operator may readily utilize aerial photographs himself for the simpler aspects of his mining program, but their maximum value can be realized only when studied by those trained and experienced in their application. Use of the photographs for geologic mapping and other exploratory purposes previously outlined requires a thorough basic knowledge of geologic processes and the proficient use of necessary photo-study techniques. Proficiency is the product of training and experience. The photogeologist, as any specialist in a given field, gains skill through application of his fundamental knowledge of geology to problems in photogeologic mapping. If the operator neglects photogeologic study of his aerial photographs by an experienced geologist, he will realize only a small portion of the great potential value they have for him.

The writers are indebted to John H. Weitz, cooperating geologist, Pennsylvania Geological Survey, for certain information used in the illustrations. Thanks are due to S. H. Cathcart, director, Pennsylvania Geological Survey, and Dr. A. B. Cleaves, Washington University, for helpful suggestions in the preparation of the manuscript.

Rearmament and Industrial Mobilization

(*Continued from page* 31)

some production, and particularly the know-how in these minerals for security purposes?

We are confronted here with two problems of national policies—one of national security, and the other of Governmental assistance by one method or another for the mining industry, to counteract the lower wages and standards of living of the foreign sources. Although they are intimately related, it will be unfortunate if we completely confuse these two national policies, or allowed one to become the handmaiden of the other.

Again, to what extent should stockpiling compete with private demands and reduce the industrial supply for those items short in our present economy? Until recently, purchases for the stockpile have usually been deferred in the face of any interference with commercial demands. This has been one of the factors causing the present unsatisfactory condition of the stockpile. A partial solution may lie in securing additional quantities of strategic materials through the European Recovery Program, as contemplated by that law.

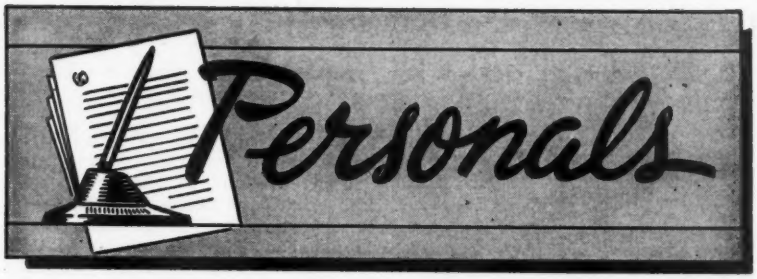
The ultimate answer to the stockpiling problem appears to be increased production, both at home and abroad. Fortunately, the current stockpiling appropriation permits long-term contracts which should have some effect to that end.

As regards the relationship of Economic Mobilization Planning to the mining industry, the most significant fact is the lack of a definite minerals policy. From a national-security standpoint, we must start with the assumption that in the event of another war there will be a greater demand for minerals than ever before. One of the frank questions in the minerals problem is how to meet that demand. Certainly we are far from the "have-not" nation if our resources are properly developed. On the other hand, we are not completely self-sufficient; and, in spite of what might be done in the United States, we shall probably become increasingly dependent on foreign sources for some materials.

There is no question but that we need a sound, going mining industry in the United States. Reserves in the ground that require years to develop are of little value after the outbreak of war. We need more exploration and continued research and improvement in the technology of extraction and processing.

We need to keep the cost of metals to the consumer at an equitable level. At the same time, we must look beyond our own shores. A government opposes us which controls the potential maximum resources, much greater than ours. International tension may well last for years. Presently we have a marked advantage in the development of our resources and industrial system. We must maintain that advantage, but can we do so relying solely on the continental United States? Must we not aim at expanded develment of mineral resources, at further industrialization and at the increased war potential of countries friendly and accessible to us? The pressing question in the formulation of a proper minerals question is not the desirable end result, but how to accomplish that. Shall we use high tariffs, import quotas, direct subsidies, a premium price plan, governmental aid and exploration, governmental experimentation or assistance therein, modification of the tax structure, foreign loans, trade agreements, free and wide-open competition, or Government planning and regulation?

Enormous amounts of copper and zinc are used to make artillery shells



Dr. Alfred Razor, a geologist for the U. S. Atomic Energy Commission, has been in Arizona to inspect the uranium deposit in the Hack's Canyon areas of northwestern Arizona. He was accompanied on the field trip of investigation by **Charles H. Dunning**, director of the Arizona Department of Mineral Resources.

E. B. Wagner, electrical engineer for Lehigh Valley Coal Co., at Wilkes-Barre, Pa., will resign as of October 31, after more than 41 years of service. He expects to take up resident at Daytona Beach, Fla.

Jonathan P. Falconer, general manager of the Foley Construction Co., and **F. X. Minelli**, left recently for Antofagasta, Chile, to launch construction of a $60,000,000 copper smelter at Chuquicamata, one of the largest engineering projects in South America.

George W. Lauterbach has resigned his position as vice-president of the Republic Coal & Coke Co., Chicago, to become president of the Frontenac Coal Mining Co. which is developing a mine at Danville, Ill.

F. C. Green was recently appointed assistant general manager of the Chino Mines Division, Kennecott Copper Corp., at properties at Hurley and Santa Rita, N. M. For the past few years Mr. Green has been mill superintendent at Hurley and since January 1, 1948, general superintendent of the Chino properties.

Edward A. Schroer has been advanced to the position of mill superintendent and **Bernard C. Jacobs** to the post of chief metallurgical engineer, succeeding **Walter J. Akert** who has been advanced to assistant mill superintendent.

Grant Stauffer, director of American Mining Congress, a member of the National Coal Association executive committee and a member of the Bituminous Coal Institute policy committee, was elected to the presidency of the Chicago Great Western Railway Co. and to its board of directors and executive committee.

Joseph A. Martino, president of the National Lead Co., has been elected to the board of the Doehler-Jarvis Corp.

Glen E. Kitchen has resigned his position with Island Creek Coal Co. to become assistant to the vice-president and general manager of the three mines of the Dickinson Fuel Co., Charleston, W. Va.

At the regular monthly meeting of the board of directors of the Eagle-Picher Co., **T. Spencer Shore** was elected president to assume office January 1, 1949. **Joel M. Bowlby**, who has been

T. Spencer Shore

Joel M. Bowlby

president since 1941, became chairman of the board and will continue as chief executive officer and general manager of operations of the Eagle-Picher group. **Joseph Hummel, Jr.**, who has been board chairman since 1941, was appointed honorary chairman. **Elmer Isern**, formerly vice-president of the Eagle-Picher Mining and Smelting Co., was elected president of that subsidiary.

Elmer Isern

Nathaniel Kirk, formerly coal mine inspector for the U. S. Bureau of Mines, has been appointed safety director for New Kathleen mine, Union Colliery Co., DuQuoin, Ill. Before joining the Bureau, Mr. Kirk was a superintendent with the Pittsburgh Consolidation Coal Co.

Stanley A. Easton, president, Bunker Hill and Sullivan Mining and Concentrating Co., will be the recipient of the W. L. Saunders Medal for 1949. This award is made annually by the American Institute of Mining and Metallurgical Engineers to recognize distinguished achievement in mining. Mr. Easton was cited "for his leadership over a period of 50 years in the development of the Bunker Hill and Sullivan, one of the great mining enterprises of the world."

George F. Getz, Jr., is president of the Getz Coal Co. Mr. Getz was formerly chairman of the board, which office was recently abolished. **Kyle R. Davis** is now executive vice-president of the company.

John G. Reilly, formerly managing director Cia de Real Del Monte Y Pachuca, since 1921, is now general manager of the Bayard Department of the United States Smelting Refining and Mining Co. This new position was created in line with the policy of decentralizing the control of the company's operations. **L. H. Duriez** will continue in his capacity as manager of the Bayard Department and **James Neuman** as assistant to the manager.

John G. Reilly

William Wraith, consultant engineer to the Andes Copper Mining Co., Chile Exploration Co., Inspection Consolidated Copper Co., and Greene Cananea Copper Co., will be the recipient of the James Douglas Gold Metal for 1949. The American Institute of Mining and Metallurgical Engineers makes this award from time to time to recognize distinguished achievement in nonferrous metallurgy. Mr. Wraith was cited "for conspicuous leadership in a fundamental contribution to technologic progress in the arts of beneficiating ores of nonferrous metals, especially those of copper."

James C. Gray, general superintendent, coal mines division, Tennessee Coal, Iron and Railroad Co., Birmingham, Ala., has been named assistant manager of raw materials for the company. **Elwood B. Nelson**, formerly assistant general superintendent of the division, succeeds Mr. Gray as general superintendent. **Stanley D. Michalson** has been appointed chief engineer of the coal mines division, and **John M. Sponsler** has been appointed assistant chief engineer.

Sherwin F. Kelly, of Sherwin F. Kelly Geophysical Service, Inc., has returned from a four-month survey trip in South America. Mr. Kelly reports that South America's principal metal producing countries are increasing their output by intensified development of the mines and by the use of the newest prospecting methods to penetrate additional ore deposits.

F. Gray Weller has joined the Clyde E. Speer Coal Co., Gulf Bldg., Pittsburgh, Pa., as sales engineer to serve the middle Atlantic industrial area.

Howard J. Vander Veer, of Salt Lake City, has been appointed a special regional consultant on mineral matters by the Bureau of Land Management for the Colorado-Utah regional office. He will act as the Bureau's liaison representative with mining and oil and gas associations, and companies prospecting and developing in that area.

Charles A. Owen, president of the Imperial Coal Corp., and vice president of the National Coal Association since 1943, and a director since 1930, was elected president of NCA at their 1948 Annual Convention.

Harry LaViers, vice president of the South-East Coal Co., and Fred G. West, vice president of the Butler consolidated Coal Co., were elected directors.

Charles F. Colbert, Jr., president and general manager of the Pittsburgh Metallurgical Co. since 1939, was reelected at the annual stockholders meeting in October. **Kenneth Seaver** was elected chairman of the board and treasurer; **Ben F. Webster, Jr.**, secretary and assistant treasurer; and **John T. Mechem**, assistant secretary.

William Church Osborn, director and member of the executive committee of the Phelps Dodge Corp., has resigned because of poor health. **Vanderbilt Webb** has been elected to serve in his stead.

George C. Trevorrow has been appointed general superintendent of coal mines for the Wheeling Steel Corp., succeeding **W. E. Monks**. Mr. Monks will continue with the organization in an advisory capacity.

Rudolph Ekar, of the engineering department of the Snyder Mining Co., on the Mesabi range, is now assistant chief engineer of the firm. **A. C. Borgeson** is chief engineer.

—*Obituaries*—

John T. Sydnor, 60, president and general manager, Rail & River Coal Co., Bellaire, Ohio, died September 12 at Wheeling, W. Va. Mr. Snydor had formerly been vice-president and general manager of the West Virginia Coal & Coke Co. and president of Mt. Sterling Land Co. He was past president of West Virginia Coal Association and a member of the State Planning Board. He was outgoing president of the Old-timers' Club of Charleston.

Thomas A. Monahan, of the Bradley Mining Co. and long prominent in gold mining in the Philippines and quicksilver development in the Western States, died on August 29 in Nevada City, Calif., at the age of 49. Mr. Monahan was born and raised in California and received underground training from his father, Lewis C. Monahan, for many years superintendent of mines in California and Canada. Following service in the first World War, he was employed by the Denver Rock Drilling Co. and later in the 1920's by Phelps Dodge. He then spent a decade in the Philippines. He held various consulting jobs in the West and in Alaska, also managing the Great Eastern Mine in California and the Hermes in Idaho. His recent work for the Bradley Mining Co. was on quicksilver and commercial rock development in California and on the Oaks tunnel venture near Silver City, N. M.

Francis E. Finch, 59, vice-president and sales manager of the Centrifugal and Mechanical Industries, Inc., died at his home in Sappington, Mo., November 2, 1948. Mr. Finch graduated from Cornell University with a M.E. degree in 1912, and has been engaged in engineering, sales and technical writing for 36 years; first as president of Ruggles-Coles Engineering Co., and second as vice-president and secretary of Hardinge Co., Inc., of York, Pa., and for the past 8 years with the Centrifugal & Mechanical Industries, Inc., of St. Louis.

E. V. Babcock, 85, president of the Babcock Coal & Coke Co., Pittsburgh, Pa., and a former mayor of Pittsburgh, passed away September 2.

H. C. Faust, general manager of the United Pocahontas Coal Co. at Crumpler, W. Va., was killed in an accident on August 22. Mr. Faust was 56 years of age and had been connected with this company in various capacities since 1917.

W. A. (Bill) Julian, representative in Mexico for the Mine and Smelter Supply Co. and well-known in mining circles throughout the Southwest and Mexico, died in El Paso, Texas, September 17 at the age of 74. He was at one time associated with the Cananea Consolidated Copper Co. and during World War I was appointed American Vice-Consul at Cananea, Sonora. In 1927 he accepted the position with the Mine and Smelter Supply Co. which he held until the time of his death. Mr. Julian was born in California but spent most of his boyhood in El Paso. He attended Notre Dame University.

Harry Thompson, 47, vice-president of Davis-Clinchfield Export Coal Corp. and a familiar figure in coal circles in the Washington area, passed away September 13. Mr. Thompson had been chief of the marketing section of the Bituminous Coal Division of the National Coal Association. He left that position to become technical advisor for the Bituminous Coal Producers Board for District No. 7, and then secretary of the Board. In June, 1947, he accepted the position with Davis-Clinchfield which he held until the time of his death.

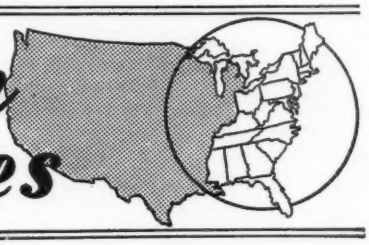
George L. Smith, 56, died October 18, at his home in Indiana, Pa. Mr. Smith, who was National Program Chairman of the Coal Convention of 1946, had been prominent in the coal mining industry for many years. In 1941 he was named vice-president and general manager in charge of operations for the Rochester and Pittsburgh Coal Co., Indiana, Pa. After retiring on July 1, 1947, he was retained by the R & P Coal Co. as a consultant. During World War I, Mr. Smith served with the U. S. Navy in Philadelphia as a coal inspector.

Matthew Morgan Reese, 71, pioneer Pacific northwest mine owner and engineer, died in Seattle, Wash., on October 15. He was formerly connected with the Sunshine mine at Kellogg.

Jack Watt, 48, died September 19 at Philipsburg, Mont., after several months' illness. He was superintendent of the Moonlight Mining Co. near Princeton, Mont.

NEWS and VIEWS

Eastern States



Coal Mining Institute Meet Scheduled

The sixty-second annual meeting of the Coal Mining Institute of America, will be held at the Fort Pitt Hotel in Pittsburgh, Pa., on December 9 and 10. Guest speaker at the annual banquet Thursday night, December 9, will be Harry M. Moses, president, H. C. Frick Coke Co., Pittsburgh, Pa.

Pittsburgh Consolidation Receives "Oscar"

An "Oscar of Industry" was awarded to Pittsburgh Consolidation Coal Co. for its 1947 report to stockholders submitted in the eighth annual survey conducted by the *Financial World.* Runner-up awards were given to Truax-Traer Coal Co. and United Electric Coal Cos. for second and third best reports respectively.

Bethlehem Acquires J. H. Weaver Company

The outstanding shares of the vast properties of the J. H. Weaver Co. have been acquired by the Bethlehem Steel Corp. The transaction involves approximately 12,000 acres of developed coal properties in Cambria and Indiana Counties, Pa., and approximately 1400 acres of developed coal properties in Harrison County, W. Va. This includes the entire properties of the Monroe Coal Mining Co., Heisley Coal Co., and the Red Lands Coal Co., whose mines have, for many years, been known as among the best bituminous producers in the state. Also included in the deal by Bethlehem was the leasing from the Clearfield Bituminous Coal Corp. of approximately 23,000 acres of undeveloped coal lands in Cambria County adjoining the Weaver coal. These properties will increase Bethlehem's reserves of low volatile coal required for the production of metallurgical coke. Announcement of the transaction was made by Eugene D. Grace, chairman of the Bethlehem board.

Island Creek Makes Executive Appointments

A series of executive appointments has been announced by James D. Francis, president, and Raymond E. Salvati, vice-president of operations of the Island Creek Coal Co., Pond Creek Pocahontas Co., and affiliated companies. The appointments were brought about by anticipated increase in tonnage resulting from the companies' extensive development program.

John J. Foster has been promoted to assistant vice-president in charge of industrial and public relations functions at Island Creek Coal Co., Pond Creek Pocahontas Coal Co., Marianna Smokeless Coal Co., and Island Creek Fuel & Transportation Co. Charles E. Walker has been promoted to general manager of the Island Creek Coal Co. with headquarters at Holden, W. Va. Mr. Walker was formerly general manager of the Pond Creek Pocahontas Coal Co.

R. Glenn Lazzell was made assistant to the vice-president of operations, with headquarters at Huntington, W. Va. Mr. Lazzell was formerly general superintendent of the Island Creek Coal Co. In his new post Mr. Lazzell will handle specialized operating and engineering problems with emphasis on new developments, at Island Creek Coal Co., Pond Creek Pocahontas Coal Co., Marianna Smokeless Coal Co., Island Creek Fuel & Transportation Co., Carnegie Dock & Fuel Co., and Penowa Coal Co.

William Haslam is now manager of the Kentucky Division of Pond Creek Pocahontas Co. Hubert Barber is manager of the Bartley Division of Pond Creek Pocahontas Co. William Diamond has been made manager of Marianna Smokeless Coal Co.

Thomas Mitchem has been promoted to the post of division superintendent of Rock House Division, Island Creek Coal Co. Michele Depietro, Jr., has been made division superintendent of Holden Division, Island Creek Coal Co. Nicholas T. Camicia has been promoted to the position of division superintendent of Mud Fork Division, Island Creek Coal Co.

Reservoir Construction for Iron Ore Development

Construction work is expected to be completed this fall on the $140,000 reservoir which is being built to provide a more constant source of water supply for the Jones & Laughlin Ore Co's. Benson Mines plant. The Groves, Lundin & Fox Co. is the contractor for the reservoir which will be build on the Little River, a branch of the Oswegatchie. Edwin S. Cullings of Watertown, is consulting hydraulic engineer for the job.

World's Largest Dragline Being Assembled

A walking dragline which will eat 76 tons at one bite, take 6-ft, 2-in. steps and leave footprints 352 sq ft in area is now being assembled for the Powhatan Mining Co. at Bloomingdale, Ohio. Weighing 1390 tons with a boom 200 ft in length and a bucket of 30-cu yd capacity, the giant dragline will be operated in open-pit mining service. The largest in the world, the dragline was built by Marion Power Shovel Co.

News From The NCA Annual Convention

A bright future for the coal industry was outlined at the 31st annual convention of the National Coal Association, attended by more than 500 members at the Waldorf-Astoria Hotel in New York City, October 4-5-6.

George A. Lamb, Pittsburgh Consolidation Coal Co., predicts a big demand for coal and attributed the 1948 decline to the decrease in export demand.

Lawrence E. Tierney, Jr., chairman of the NCA committee on interstate and foreign commerce, sounded the note that use of other fuels need not hamper production or demand for coal. Adequate supplies of coal will be used for purposes for which limited supplies of oil and other fuels cannot be sacrificed.

C. K. Steins, Pennsylvania Railroad, outlined a case for adapting power-fine bituminous coal to the gas turbine power plant for locomotives. It costs 90c for the same amount of energy in the form of high-grade liquid fuels as it does for 20c worth of coal, and bituminous coal is available in abundance.

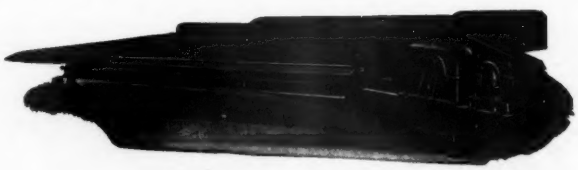
Diversification of land uses was urged to further increase coal profits. This includes the reclamation of worked out strip-mining lands for forestry, dairying, and real estate promotion.

Charles A. Owen, president of Imperial Coal Corp. and president of the Coal Exporters Association of the United States, Inc., was elected president of NCA. Other officers elected included J. B. Battle, formerly executive secretary, named executive vice-president, and James W. Haley was continued as general counsel and secretary. George H. Love, of Pittsburgh Consolidation Coal Co., was elected a vice-president. Three new directors were named. The meeting was climaxed with a banquet where Dr. Norman Vincent Peale of the Marble Collegiate Church gave an address on the art of living. Walter Tuohy, vice-president of the Chesapeake & Ohio Railway was toastmaster.

Civil Service Positions Open

Examinations to fill mining engineer and metallurgist positions paying $3,727 to $6,235 a year have been announced by the United States Civil Service Commission. Mining engineer positions are open in the Department of the Interior in Washington, D. C., and throughout the United States. Information and application forms may be obtained at most post offices, from Civil Service regional offices, and from the Commission, Washington, D. C.

L. E. YOUNG
Consulting Engineer
Mine Mechanization
Mine Management
Oliver Building Pittsburgh, Pa.



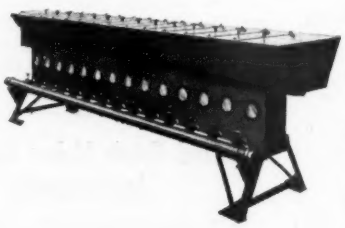
NEW METHODS
DEMAND *Super Duty*
TABLES

Heavy ore production during the past decade has emphasized the need for utmost efficiency in concentrating methods.

Owners of new processing plants, and of older plants that are being modernized, are installing SuperDuty Diagonal Deck Concentrating Tables as standard equipment.

Engineers and operators alike recognize the high efficiency of these space-saving tables. They know that the diagonal deck and the smoothly coordinated action make for higher grade concentrates, leaner tailings and fewer middlings for recirculation.

Whether you have need for one or a hundred concentrating tables, it will pay you to install SuperDutys. Your inquiry is invited. Ask for Bulletin 118A.



CONCENCO TYPE "CPC" CLASSIFIER

This All-Steel Constriction Plate Classifier is available in 1 to 10 or more cells. Each cell has a pressure chamber at bottom, a sorting column just above, and a launder section at top. Advantages offered are: (1) sharp separation, (2) accurate classification, (3) as many spigot products as there are cells, (4) continuous discharge, (5) no moving parts, (6) low maintenance cost.

THE DEISTER★
CONCENTRATOR
COMPANY
CONCENCO PRODUCTS

★ *The ORIGINAL Deister Company* ★ *Inc. 1906*

917 Glasgow Ave. • Fort Wayne, Ind., U.S.A.

Eleventh Annual Fuels Conference

The eleventh annual joint fall conference of the Coal Division of AIME and the Fuels Division of ASME was held at White Sulphur Springs, W. Va., November 3-4.

Paul Averitt, U. S. Geological Survey, discussed the work of the Geological Survey on coal and coal reserves at the first session of the conference. J. D. Doherty, U. S. Bureau of Mines, talked on coal and synthetic fuels, and G. R. Spindler, Joy Mfg. Co., Brussels, Belgium, dealt with "Mechanical Mining in Europe." E. G. Bailey, president, ASME, was the speaker at the banquet that evening on the subject of "Engineers' Opportunities in the Field of Fuels."

At the second session, organization, evaluation and operations were discussed, with Elmer R. Kaiser, Bituminous Coal Research, Inc., Harlan W. Nelson and James B. Purdy, Battelle Memorial Institute, and J. T. Crawford, North-Western-Hanna Fuel Co. presenting papers. Carl E. Miller, Battelle Memorial Institute, spoke at the Tuesday luncheon on "Continental Fuel Utilization."

R. J. Helfinstine, Gilbert H. Cady, Michael Perch, and C. C. Russell participated in the closing session. Mr. Helfinstine and Mr. Cady dealt with the topic "Correlation of the Performance Characteristics of Domestic Stoker Coals with Their Chemicals and Petrographic Composition." Mr. Perch and Mr. Russell presented "A Study of Coal Classification and its Application to the Coking Properties of Coal." The conference closed with a joint executive committee meeting.

Vanadium Opens New Plant

A new aluminum alloy plant at Eddystone, Pa., with initial capacity of about 2,000,000 lb of aluminum alloy monthly has been opened by the Vanadium Corporation of America.

BCI Policy Committee Reviews Operations

The members of the BCI Policy Committee met in New York recently for the purpose of reviewing BCI operations and to consider the various projects in the public relations and advertising programs. The following officers were elected, Fred S. McConnell, president; R. L. Ireland and Grant Stauffer, vice-presidents; R. H. Knode, treasurer; J. D. Battle, secretary. The present Policy Committee comprised of H. B. Baird, DeWitt Buchanan, Jr., J. D. Francis, R. L. Ireland, Hooper Love, and Grant Stauffer, with Mr. McConnell as chairman ex-officio, was reelected.

THE *Heart* OF { PROTECTION / PRODUCTION

A roof fall . . . a flash of flame . . . a trolley wire down! What happens next? Fire? Explosion? *And what about your production?* Do all your operating sections suffer, while trouble in just one section is cleared?

If a mine electrical distribution system is properly sectionalized with I-T-E Type KSC Automatic Reclosing Circuit Breakers, trouble in one section cannot stop service in others. Production levels are raised: time lost because of electrical disturbances is kept to a minimum, and safety to personnel and equipment is assured.

A rugged, completely dependable breaker, the KSC was developed especially for the mining industry. It is compact in construction and flexible in operation; it can be readily moved as mining progresses and centers of loads change. It is completely metal enclosed for safety and for prevention of unauthorized adjustments, yet is readily accessible for inspections and maintenance.

The KSC operates on circuits which can be fed in either direction, and it opens at first sign of short or overload—reclosing automatically on a return to normal line conditions. Voltages can be safely improved throughout the system by tying all feeders and trolleys into one network. Sections help one another by raising the diversity factor for the entire system, yet—with the KSC installed—shorts cannot be fed by distant substations, and substations are quickly separated when disturbances occur.

● Increased production is just one of the many advantages to be gained by sectionalizing your electrical distribution system. The I-T-E representative in your locality will be glad to tell you of others, and to advise you on the proper applications of I-T-E Type KSC Automatic Reclosing Circuit Breakers to your mine. Use his service with no obligation.

Be Production-wise . . . SECTIONALIZE

S-E-C-T-I-O-N-A-L-I-Z-I-N-G

SWITCHGEAR

The Leader In Technical Excellence

I-T-E Circuit Breaker Company, 19th & Hamilton Sts., Phila. 30, Pa.
31 Offices in United States & Canada

SWITCHGEAR • UNIT SUBSTATIONS • AUTOMATIC RECLOSING CIRCUIT BREAKERS

I'M YOUR MAN

FOR MONEY-AND-TIME-SAVING
***FULL-FLOW* FITTINGS**
AND *TWO-BOLT* COUPLINGS

EVERY Victaulic Elbow, Tee and other Fitting is *full-flow* . . . designed with wide, smooth-sweeping turns and true circular walls that increase pipe-line delivery *and lower pumping costs.*

THE TWO-BOLT simplicity of Victaulic Couplings means: just a couple of swift, easy turns of a standard T-wrench buttons up any piping system . . . saving costly materials and valuable man-hours installing, repairing, or salvaging.

VICTAULIC COUPLINGS also build into pipe lines: flexibility that automatically adjusts for contraction-expansion . . . a union at every joint that allows removal of any pipe length, valve, or fitting without damage to pipe ends and without backing off adjoining sections . . . lock-tight, leak-proof joints that can't pull out or blow off under pressure, vibration, or sag.

FOR FULL ECONOMY in your piping system . . . make it *all* Victaulic. And use the new "VIC-GROOVER" that grooves pipe ends twice as fast with only half the effort of regular pipe threaders.

WRITE TODAY for Victaulic Catalog and Engineering Manual No. 44-8 . . . and for the new "Vic-Groover" Catalog No. VG-47.

SELF-ALIGNING PIPE COUPLINGS

VICTAULIC

EFFICIENT FULL-FLOW FITTINGS SIZES—3/4" THROUGH 60"

VICTAULIC COMPANY OF AMERICA
30 ROCKEFELLER PLAZA, NEW YORK 20, N. Y.

Victaulic, Inc., 727 W. 7th St., Los Angeles 14, Calif.
Victaulic Company of Canada, Ltd., 200 Bay St., Toronto 1
For export outside U. S. and Canada: PIPECO Couplings and Fittings:
Pipe Couplings, Inc., 30 Rockefeller Plaza, New York 20, N. Y.

Copyright 1948, by Victaulic Co. of America

Tin Study Group Meets at The Hague

The third meeting of the International Tin Study Group opened at The Hague on October 25. U. S. delegate is Donald D. Kennedy, chief, International Resources Division, Department of State. Mr. Kennedy's advisers were Carl Ilgenfritz, vice-president, U. S. Steel Corp.; Evan Just, director, Strategic Materials Division, Economic Cooperation Administration; W. F. McKinnon, associate director, Office of Metal Reserve, Reconstruction Finance Corp.; Charles White Merrill, chief, Metal Economics Branch, Bureau of Mines; and Erwin Vogelsang, chief, Tin and Antimony Section, Metals Division, Department of Commerce.

National Lead Takes Over Titanium Alloy Co.

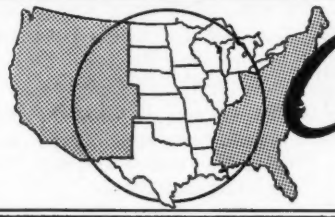
National Lead Co. has taken over the Titanium Alloy Manufacturing Co. including the head offices in New York City and the plant at Niagara Falls, N. Y., which produces compounds of zirconium for use in the ceramics industry and alloys to titanium.

Kentucky Institute Discusses Power Problems

The Eastern Kentucky Electrical and Mechanical Institute held their regular monthly meeting October 11. C. A. McKinney, district superintendent of Kentucky and West Virginia Power Co., discussed "Handling the High Line with Safety." Frank Forsythe, Jr., described "AC Phase Conversion" and Sam Tucker, superintendent of maintenance for Elk Horn Coal Corp., outlined "Practical Methods of Overcoming Commutation Troubles in D.C. Motors." A capacity crowd was present for the dinner, meeting, and discussion that followed.

Progress Made on Quebec Iron Deposit

The new Quebec iron mines will cost an estimated $300,000,000 to develop with a potential yield of 300,000,000 tons of high grade hematite iron ore, according to Jonathan Robinson, Provincial Minister of Mines. $4,500,000 has already been spent on exploration work, with the Hollinger North Shore Exploration Co. working in close association with the Hanna Co. of Cleveland, Ohio. A Canadian subsidiary of the Kennecott Copper Corp. has spent over $1,000,000 in building a 27-mile railway in the Labrador-Quebec border region.



Central States

New Zeigler Mine Opened

The Bell & Zoller Coal & Mining Co., Chicago, recently opened a new operation, the Zeigler No. 3, which will replace the tonnage of the company's Zeigler No. 1 mine which ras been worked out and will soon be abandoned. Anticipated production is 6000 tons per day and the new mine has an estimated life of 15 to 20 years.

The Zeigler No. 3 is a slope mine equipped with a belt conveyor. Operations will progress on the same seam as the Zeigler No. 1 was producing from and the product will be prepared in the preparation facilities at the Zeigler No. 2.

To afford the safest and most modern mining methods the new mine is highly mechanized. Eight-ton shuttle cars and rubber-tire mounted cutting machines are used. All coal is shot with Airdox.

Vicar Shaft Completed

Walsh Construction Co. has completed sinking the Vicar shaft of the Jones & Laughlin Ore Co. at the mine site located east of Wakefield, Mich., on the Gogebic iron range.

C. & H. Opens Zinc Mine

The Calumet & Hecla Consolidated Copper Co., through the Calumet Corp., a subsidiary, is actively opening a zinc property three miles south of Shullsburg, Wis. Following a drilling campaign, the shaft is being sunk and plans are being made to open property for production. A government owned mill, formerly in use by the Island Lead and Zinz Co., Livingston, Wis., has been purchased and will be moved to the new mine.

Richmond Mine Receives Safety Award

The Richmond mine of the M. A. Hanna Co., at Palmer, Mich., was awarded the Certificate of Honorable Mention for having worked through the calendar year 1947 without a lost-time injury by "Explosives Engineer" who sponsors the National Safety Competition. The mine has operated without a fatality since it began operations in 1926, having a total of 891,672 manhours and producing 2,880,894 tons of ore. There have been no lost-time accidents since November, 1943, and the severity rate for the last 20 years has been 0.01. The certificate was presented at a meeting of the supervisors and employes on September 28.

Research Laboratory Construction Program

The Edward Meyer Construction Co., with headquarters in Oshkosh, Wis., is erecting steel for the new research laboratory of the Cleveland-Cliffs Iron Co. at Ishpeming, Mich.

In the new structure, metallurgists will devise methods of the treatment of low-grade ores, of which the company has a vast tonnage on the Marquette Range.

Mesabi Co. Seeks New Pipeline

The Mesabi Pipe Line Co. is seeking authority to construct a 400-mile 18-in. natural gas pipeline from Keokuk, Iowa, through Wisconsin and Minnesota, to the Mesabi Range. The over-all purpose will be to receive gas from the proposed trunkline system and distribute it in the Mesabi Range for use in proceeding low-grade iron ore, and also to distribute such gas along the route of its system.

Semi-Portable Plant at Pennington Mine

The new semi-portable ore treatment plant at the Pennington open pit iron mine on the Cuyuna Iron Range, Minn., has been equipped with a heavy media plant to beneficiate iron ore. The plant went into production August 19 and is rated to produce 100 tons of concentrates per hour. The lease for the property is owned by the Dates Mining Co., with Rhude and Fryberger, contractors, as operators.

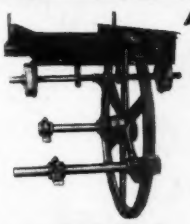
The owners state that the plant is furthering the life of the mine by processing the crude ore into a higher grade product for shipment, treating high silicious ore mined over a pit area of the lower reaches of the Pen-

Reciprocating Feeder...

Special lips, feed fingers, or grizzly plates with any size holes or slats also available

Some Dealer Territories Available

WELL ENGINEERED . . . PRECISION BUILT



For COAL, SAND, GRAVEL, and other bulk materials. Made of angle-braced ¼" welded plate — pendulum and cast iron wheel supported, or four wheel supported — and with lubricated bearings, and spur gear drive. Easy to install — flexible as to operation. Variety of sizes . . . to fill your particular requirements. Write for Bulletin MC-1.

AMERICAN CONVEYOR COMPANY

CONVEYORS OF ALL TYPES . . . FOR MINES, CONSTRUCTION, & INDUSTRY

1115 W. ADAMS STREET • CHICAGO 7, ILLINOIS

nington property that formerly shipped out the major portion of the ore body. The crude ore arriving in trucks from the pits contains about 42 percent iron and 25 percent silica, and the grade of final concentrate produced is 50 percent iron (natural) and 12 percent silica.

The plant is easily moved and reassembled elsewhere as most of the equipment is out-of-doors.

Open-Pit Operations Resumed

The Alco Lead Corp. is again producing lead ore from the open-pit of the Patrick mine, Hardin County, Ill. A sink-float plant from Alco's Mineral Ridge mine in Kentucky will be moved to the Patrick mine, where a new mill is being completed.

Unwatering Nears Completion

Unwatering operations at the Bristol iron mine of the Inland Steel Co. at Crystal Falls, Mich., are almost completed and plans to begin mining soon. Surface buildings and facilities are being rehabilitated for use.

Illinois Mining Institute Holds 56th Annual Meeting

The 56th annual meeting of the Illinois Mining Institute was held November 5 in Springfield, Ill. The papers for the technical sessions were prepared and sponsored by the Illinois Society of Coal Preparation Engineers and Chemists, and the Mining Electrical Group of Southern Illinois.

J. W. MacDonald, Old Ben Coal Corp., was chairman of the morning session and W. J. Jenkins II, Consolidated Coal Co., presided over the afternoon session.

Papers on centrifugal drying were presented by John Wilson, Union Collieries Co., and Laning Dress of the Binkley Coal Co. William C. McCulloch, Roberts and Schaefer Co., discussed cleaning plants and E. T. Groat, Kelso-Burnett Electric Co., the use of a-c power for strip mining.

W. M. Arentzen, Lee-Norse Co., presented a paper on service units and C. C. Conway, Consolidated Coal Co., on roof support. Discussions followed the presentation of each paper. Following the annual banquet, L. E. Young and J. W. Starks were presented with honorary memberships.

For Sale

Complete Operating Electrical Generating Plant 2750 KW Capacity Coal Boilers.

Available as complete unit, with operating engineer to supervise dismantling and re-erecting. In operating condition.

LITTLE SISTER COAL CORP.
310 South Michigan Avenue
CHICAGO 4, ILLINOIS

Promotions by Pickands Mather & Company

Recent promotions by Pickands Mather & Co. in its iron mining operations in the Lake Superior region have been announced as follows: Russell J. Jose, has been named superintendent of the Ironton mine, Bessemer, Mich., on the Gogebic iron range; Arthur Martini has been promoted to mining captain of the Aimmerman iron mine on the Menominee iron range, Iron River, Mich.; Hayden Sears has been promoted to superintendent of the Corsia iron mine, Elcor, Minn., on the Mesabi range.

Parmanco
MECHANICAL FEED
HORIZONTAL DRILL
WITH TRACTION DRIVE

Ten years of field test has proven that our power-feed design of direct, transmission and worm gearing with two-speed control will not only cut shot hole drilling time in half but also eliminates costly maintenance delays. V-belt drive to the power-feed with an additional ample clutch in that assembly gives absolute control of a drilling speed of two to three feet per minute with a retrieving speed of twenty-four feet per minute.

The Parmanco Horizontal is adapted to all forms of high-wall drilling, will handle a six-inch auger up to a distance of sixty feet or more and, by use of our patented augers with interrupted flights and secondary cutters, will drill an absolutely clean hole with a minimum of torque. It permits the drilling of a controlled-angle hole which makes possible a great saving of explosives through the cantilever effect of this controlled-angle drilled hole.

EFFICIENT STRIPPING STARTS WITH EFFICIENT DRILLING

PARIS MANUFACTURING COMPANY
PARIS, ILLINOIS

North Range Mining Co. Adds New Lease

The North Range Mining Co. has bid and obtained a lease from the State of Michigan, on the Warner mine, 1½ miles southeast of Amasa, Mich. The Warner mine was last operated by Pickands Mather & Co., who surrendered the lease in 1934 when production was halted. It has completely filled with water during the period of dormancy, but was once one of the most active mines in Iron County, Mich.

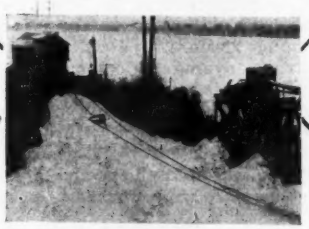
C. & H. Shaft Sinking Progress

At Calumet and Hecla's zinc-lead project in southern Wisconsin the shaft was down 89 ft on September 23. A crew is busy dismantling the mill at Platteville, preparatory to moving to a new site at the mine.

At about 80 ft in depth, an opening in the limestone was encountered which slowed up sinking because concreting and timbering were necessary. No heavy flow of water has been encountered as yet in the shaft sinking.

The O. W. Walvoord Co. contractor, has a crew of men dismantling the mill purchased from the WAA. Some of the mill equipment has already been moved to the new site. Some additional equipment will be shipped to Calumet and a portion of it is now in the shops for reconditioning. The mill site at the new location has already been cleared and is now ready for the start of construction.

LOW COST DIGGING and STOCKPILING



Small Sauerman Scraper stores and reclaims crushed material on ground between washery and drying plant.

ON work where materials are to be moved distances of several hundred feet or more from pits, ponds, banks or stockpiles, a SAUERMAN Power Scraper or Cableway is a great money-saver because it will dig, haul and place the materials in one operation.

Sizes range from small portable units designed for cheap handling of a small hourly tonnage of loose materials up to powerful machines that will take 15 cu. yds. at a bite and move this big load a distance of 300 ft. in about one minute.

Write for Catalog

SAUERMAN BROS., Inc.

540 S. Clinton St. CHICAGO 7

Lead and Zinc Price Up

Lead advanced in price during November to 21½c N. Y., and prime western zinc moved up to 17½c per lb. The tight supply situation of these metals has been aggravated by prolonged strikes.

AIME Division Meetings

The Industrial Minerals Division of the AIME schedule of fall meetings included a meeting in St. Louis, October 13-16 and in Los Angeles, October 15.

The St. Louis meeting featured several technical sessions, a tour of local plants, a field trip to Crystal City, Potosi, Bonne Terre, and St. Genevieve, Mo. A large number and variety of papers were presented at the technical sessions. Entertainment for members and guests included several luncheons, a stag buffet dinner, a cocktail hour, and a divisional dinner.

The Los Angeles meeting featured James Boyd, director of the U. S. Bureau of Mines, as after dinner speaker on "Mineral Preparedness." A large number of papers dealing especially with California deposits, were presented at the one-day meeting.

St. Joe Division Resumes Operations

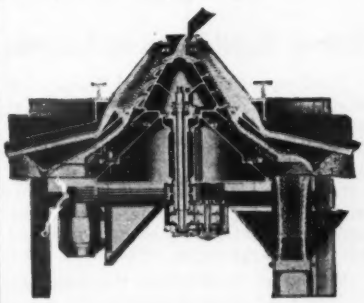
Operations have been resumed at all mining, milling, and smelting properties of the Missouri Division of the St. Joseph Lead Co., which were closed down by a strike, July 7, 1948. During the week of September 20, virtually all of the 3400 men who were out, returned to work. Production of lead is again at the rate prevailing prior to the strike.

Minnesota Fellowship Awarded

Kwang-Chi Tu has been awarded the E. J. Longyear Co. fellowship in metalliferous economic geology at the University of Minnesota. Mr. Tu is conducting experiments on hydrothermal alteration at high temperature and high pressures, under the supervision of Dr. J. W. Gruner.

the C-M-I centrifugal DRYER

dewaters and dries the smaller sizes of coal better and more economically than can be done by any other method. Records of many leading preparation plants that dry many million tons of fine coal every year prove that the performance of "C-M-I" dryers is outstanding.



Our engineering staff is prepared to give you details of the many installations in operation and to make recommendations for your drying problem based upon actual results obtained by operators of "C-M-I" machines.

CENTRIFUGAL AND MECHANICAL INDUSTRIES, INC.

146 PRESIDENT ST.
ST. LOUIS 18, MO.

AEC Negotiating For Domestic Uranium

In a step to boost domestic uranium production the Atomic Energy Commission is negotiating with Vanadium Corp. of America to buy uranium from two ore treatment plants that will start operation next year.

Most of the metal now used in America's atomic energy program comes from the Belgian Congo and Canada. But the commission said Vanadium expects to get the greater part of its ore from its own western mines and independent miners.

One ore treatment plant at Durango, Colo., will be leased to Vanadium Corp. by the commission. The other will be built by the firm in the White Canyon district of San Juan County, Utah.

National Tunnel Bought by Anaconda

Holdings of the National Tunnel and Mines Co., Tooele, Utah, were bought at auction by the Anaconda Copper Mining Co., the only bidder, on Oct. 4, for $500,000. R. C. Gormerly, who entered the bid for Anaconda, said future plans for the tunnel will not be announced until the sale is confirmed by the federal court.

Valued at $6,000,000, the holdings include 5447 acres of which 1177 acres are unpatented lode mining claims and the balance patented; and the Elton tunnel, drilled in 1941, which connects the main shafts of the Apex and Highland mines. During its period of regular operation, an average of 400 tons of ore was produced daily, and in addition, some 2500 gpm pumped from the tunnel were used for irrigating crops in the surrounding area. More than 800,000 tons of ore were produced during and after World War II.

Grant Mine Workings Drained

The raise into the old workings of the Easton-Pacific mine near Virginia City, Mont., was holed early in September, turning loose some 500,000 gals of water, the remains of several million gals estimated stored there. Earlier diamond drill holes had tapped the body of water and lowered it by approximately 3,000,000 gals to relieve the pressure to a point where it was deemed safe to blast through.

The holing through will make it possible to drive raises into workings for ventilation, thereby improving conditions of the lower levels.

Spokane May Become Regional Headquarters for Bureau of Mines

Dr. James Boyd, director of the U. S. Bureau of Mines, recently stated that Spokane, Wash., is being considered as a regional headquarters for the U. S. Bureau of Mines. Its nearness to the Coeur d'Alene lead, zinc, and silver mining district and the Metaline lead and zinc mining area, makes Spokane an extremely favorable location. At present the Bureau of Mines office at Spokane is a branch of the Albany, Ore., office of the Bureau. The Albany is primarily a research center for metallury and is too far away from the central mining activity.

Dr. Boyd stated that the Bureau of Mines station at Juneau, Alaska, will be completed in 1949 and plans will be made to expand its activities for mining in the Alaska territory.

A. S. & R. Schedules Geologic Survey

American Smelting and Refining Co. has taken a lease and option on 30 claims of the Airlanes Gold Copper Mining Co., of Nevada, for the purpose of making a geological examination of the property, Darwin J. Pope, general manager, western mining department, recently announced. The property is situated on the east side of Stillwater range above Dixie valley, about 42 miles from Lovelock, Nev.

Wyoming Coal Strip Mine Produces

Extensive coal stripping operations in excess of 1000 tons a day were expected to be started early in October in the Gebo field near Thermopolis, Wyo. This would approach the tonnage mined when Gebo was a major producer in Wyoming. Details of plans for the operation were expected to be announced shortly after operations started. During 1947, Hot Springs county field's, Kirby and Gebo, produced 69,502 tons toward the state's total output of 8,054,750 tons.

Saranac Commences Mill Operations

Milling operations are underway at Saranac Mining Co.'s property near Maxville, Mont., following the complete revamping of the plant to handle the ores of the Brooklyn mine efficiently. The Brooklyn has been extensively opened by six tunnels to a depth of 640 ft. Lateral work done approximates 3000 ft. The ore is a lead-zinc-silver-copper product. Concentrating tests indicated a highly satisfactory recovery of metal values.

Silver Bell to Expand Plant

The Silver Bell Mines Co., operator of the famous Silver Bell mine near Telluride, Colo., is expanding its capital structure for the purpose of development and exploration, new housing for employes, and doubling the present mill capacity of 100 tons a day. The Silver Bell Co. started operations in 1944 and a new flotation mill was built at that time. The mine has been operating intermittently since its discovery in 1879. Gold, silver and some tungsten ore has been produced.

Union Pacific Coal Production Down

Coal production at the Union Pacific Coal Co.'s mine near Hanna, Wyo., is running 20 to 25 percent under its wartime average. Company officials attribute this to the single shift being worked by the coal camp's 325 miners who are averaging only three and a half to four days' work a week. During the war two shifts and a maintenance shift were worked.

California Copper Operation

The old Horse Mountain Copper Mine on Horse Mountain, Humboldt County, Calif., is being reopened and developed. The property, which includes over fifty claims, has been idle for many years and buildings and equipment are badly deteriorated. The deposits are of replacement type near the contact of horneblende diorite and gabbro intrusions. Copper minerals are mainly chalcocite and malachite with some bornite and native copper. Ore bodies occur as lenses in shear zones in serpentine. The property has been purchased by the G. L. Speier Co. of Arcata and G. K. Griffith of Eureka is supervising the operation.

Long Haulage Tunnel Completed

The Canadian Consolidated Smelting Co. of Canada has completed one of the longest mine haulage tunnels in the world for the transportation of ore from the Sullivan mine to the company's milling plant at Chapman and its smelter at Trail. The tunnel is 10 by 12 ft in the clear and nearly five miles in length. The company is now treating 8500 tons of ore daily and plans to increase this to 12,000 tons daily by the addition of a sink-float plant and the largest rod mill in the world. This mill will have a diameter of 11 ft, 5 in. and will be 12 ft in length, weighing 95 tons.

Federal Reopening Montana Mine

The Federal Mining & Smelting Co. is reopening the old Iron Mountain mine near Superior, Mont., for geological examination.

The Iron Mountain mine was worked by hand methods in the early days down to the 1600-ft level, and was later opened by another company at the 1600 level by a 5600-ft haulage tunnel. This company continued the shaft to the 1800 level, but was unable to make a success of the venture.

Metaline Diamond Drilling Maps Available

N. L. Wimmier, supervising engineer in charge of the U. S. Bureau of Mines office in Spokane, announces that diamond drilling reports and maps covering the Metaline zinc-lead district in Washington are now available to the public. Director James Boyd has announced that detailed accounts of the drilling accomplished in the district will be published later.

ACM Montana-Idaho Division Earns C. F. Kelley Award

The C. F. Kelley safety award, symbol of the greatest improvement in safety for employes of the Anaconda Copper Mining Co. for 1947 was awarded to the company's Montana-Idaho division on September 29, at the ACM Employes Club in Butte. E. S. McGlone, vice-president in charge of western operations of the company, acting in behalf of Mr. Kelley, made the award to H. J. Rahilly, manager of mines for the ACM Montana-Idaho division, and Oscar Hills, president of Butte Miners Union No. 1. In winning the award, employes of the Montana-Idaho division recorded the greatest percentage reduction in its lost-time accident rate as compared with the previous five years.

Compare Compare

TRADEMARK REG.

MOLY-COP

COPPER-MOLYBDENUM-ALLOY

Grinding Balls

Compare

ALLOY STEEL
HEAT TREATED
FORGED

Regular Carbon Steel Ball

IN STRUCTURE

As illustrated above, the extreme hardness and fine martensitic structure of Moly-Cop Grinding Balls extend to the inner core.

IN SAVINGS

Moly-Cop Balls last longer. They save you money on grinding media and lower costs per ton of production. They give you more tons per mill hour because they retain their spherical shape longer than average balls. Moly-Cop balls also cut power costs and save on handling and freight costs because you need fewer charges.

Mills of the United States and mining countries all over the world have proved Moly-Cop in actual use to be a better grinding ball.

Carbon and Alloy Steel, Ingots, Blooms, Billets, Plates, Sheets, Merchant Bars, Steel Joists, Structural Shapes, Road Guard, Reinforcing Bars

Welded Wire Mesh, Wire Products, Wire Rods, Fence, Spring Wire, Nails, Rivets, Grinding Media, Forgings, Track Spikes, Bolt and Nut Products

SHEFFIELD STEEL CORPORATION

KANSAS CITY, MISSOURI

Export Representatives:
Ellsworth Wood, Post Office Box 1305, St. John, N. B., Canada

All Other Countries:
ARMCO INTERNATIONAL CORPORATION
Middletown, Ohio

New Nevada Mill Operating

The Quinn mill, just south of Beatty, Nev., has begun treating gold ore on a 24-hour schedule. The plant uses both amalgamation and final treatment with cyanide and lime. Initial runs are of low grade material so that "bugs" can be eliminated before higher grade ore is sent through, according to Clyde Barcus, superintendent.

Gold Operation Development

Long range development work is being carried on at the Ancho-Erie mine between Graniteville and Washington, Nevada County, Calif. Ore bodies there are lengthening and broadening with depth and the outlook is favorable toward operations on an increased scale. Ore will be milled during 1948 mainly from development work, and major production is not expected before 1949. The mill has been increased to process between 200 and 300 tons a day. Operations are directed by Fred Anderson of Grass Valley.

The Red Cross mine east of Washington has been reopened for sampling and development work. Mill tests on several lots of ore are currently in process.

"Notice

McKinlay Mining and Loading Machine Company, Inc., 201 Bates Bldg., Owensboro, Ky., has taken over all assets including patents, contract rights, etc., of the McKinlay Mining and Loading Machine Company (Colorado) and of the late Edward S. McKinlay, Belle B. McKinlay, Peter C. McKinlay, Anna R. O'Donnell, their heirs and assigns, insofar as said assets pertain to the McKinlay activities including the so-called entry and tunnel driving machines for coal mine and other operations.

Correspondence and inquiries are solicited which will receive prompt attention. The "McKinlay" is a very simple but proven continuous coal mining and loading machine of many (but poorly exploited) years standing. It eliminates all drilling and blasting without producing an excessive amount of fines and with minimum horsepower requirements. Accessory equipment and services to be offered with machines make same attractive for reducing face mining costs as well as equipment investment."

USGS Office Moves

The Spokane, Wash., office of the U. S. Geological Survey, regional office for Washington, Oregon, Idaho and Montana, has been recently moved from 707 Peyton Building to 157 Howard Street, Spokane, under direction of A. E. Weissenborn, regional geologist.

Wheels of Government

(*Continued from page* 94)

fused to grant the request for an immediate 8 percent increase.

There are exceptions to the request for the 13 percent average increase as follows: On anthracite and bituminous coal and coke, rate increases of 40c a net ton and 45c a gross ton; on iron ore, 35c per net or gross ton, except on ore moving to Upper Lake ports for transshipment by water.

Hearings are scheduled November 30 on both of the pending petitions.

Labor Rulings

The International Typographical Union has been held in contempt by a Federal District Court in Northern Indiana for violation of an injunction in which the Union was ordered not to discriminate against non-union printers and not to insist on closed shop conditions in violation of the Taft-Hartley Act. A stay of the contempt order, granted by the Circuit Court of Appeals in Chicago, is being vigorously contested by General Counsel Denham of the National Labor Relations Board.

Mass picketing has been held illegal by the NLRBoard in the case of the International Longshoremen and Warehousemen's Union (CIO) and the Sunset Line and Twine Co. in California. Finding that massed pickets swarmed so thickly at the plant gates that automobiles of non-striking employes could not enter, the Board declared that this "patently involved restraint and coercion of employes attempting to go to work." In this case the Board also ruled that the International and Local unions were jointly in violation of the Taft-Hartley Act, because the local union officer who encouraged pickets to attack nonstrikers entering the plant was accompanied by an official of the International union.

A trial examiner for the Board in a Chicago case ruled that mass picketing violates the Act even though it may be "peacefully" conducted. This examiner called upon the union to cease from restraining and coercing employes by directing, leading and engaging in mass picketing and by threatening or assaulting employes or restraining or coercing them in any other manner. The examiner's recommendations take effect as a Board order unless objections are filed within 20 days.

A truck driver discharged at the request of the union for non-payment of union dues is to be compensated by order of an NLRBoard trial examiner for his lost time. This compensation is to be paid jointly by the union and the employer. The case is important as it is the first instance under the Taft-Hartley Act in which a union has been made responsible as a result of illegal discrimination in the discharge of an employe.

Another important ruling of the Board holds that striking employes may be permanently replaced and excluded from voting in a collective bargaining election. The plant of the Pipe Machinery Co., Cleveland, Ohio, was struck for three months by the International Association of Machinists. Work was resumed with men hired to replace the strikers and an Independent Union petitioned for an election. Strikers and employes were permitted to vote, subject to challenge. The Board disqualified the challenges of the International Association of Machinists and supported the challenges of the Company and the Independent Union, finding that some of the strikers had been replaced permanently and that the jobs of others had been eliminated by a reduction of the company's operations. The Taft-Hartley Act states that "employes on strike who are not entitled to reinstatement shall not be eligible to vote" and the Board declared that, "it has long been established that economic strikers who have been permanently replaced are not entitled to reinstatement. It is clear, therefore, that economic strikers who have been permanently replaced are no longer eligible to vote in a representative election."

Coal Miners' Dues

Coal operators are receiving notice from officers of the United Mine Workers of America that effective November 1, 1948, the initiation fees and membership dues of the UMWA will be as follows: Fifty dollars initiation fees, payable over a five-month period, checked off and deducted from the wages of employes by the operators as heretofore; monthly dues to be $4 a month per member, likewise checked off the wages of employes as heretofore.

Of the $4 check-off, $1 is retained by the local union; $1 retained by the District organization; and $2 forwarded to the international secretary-treasurer, together with such assessments as may be levied by the different branches of the organization.

Air Survey Completed

An aeromagnetic survey of the Coeur d'Alene mining district has just been completed by a special crew from the Washington, D.C., headquarters of the U. S. Geological Survey, including W. J. Dempsey, head geophysicist, and John Reese and Fred Moore, assistant geophysicists. The party used an airborne magnetometer to record magnetic field disturbances caused by faults, dikes, and veins. This information is to be used in connection with a geological surface and underground map now being prepared by the U. S. Geological Survey and the U. S. Bureau of Mines. Geologists in charge estimate it will take about three years to complete the work.

Smelter Contract Let

Foley Brothers of Pleasantville, N. Y., have been awarded the contract for the construction of the Phelps Dodge Corp.'s smelter at Ajo, Ariz., according to an announcement by Robert G. Page, president. The plant will have an estimated capacity of 100,000,000 lb of copper a year and will be able to handle the entire output of the Ajo open-pit mine. Details of the contract, which is on a fixed fee basis, were not disclosed.

Preliminary work in preparation for smelter construction was started last June when the old concrete leaching tanks were broken up and removed from the smelter site.

Lead Property Under Development

The Western Arizona Metals Consolidated, Inc., is conducting an active development campaign at the scene of the recent lead strike on the old Lead Dike property, 16½ miles southwest of Aguila, Ariz. The Lead Dike is also known as the Dempsey Powell property.

According to Edward T. Webb, president and manager of the operating company, a crew of 16 men is employed in shaft sinking, and the 7 by 9 ft shaft has attained a depth of more than 100 ft and has been in ore for the entire distance. When a depth of 200 ft is reached, the company proposes to start drifting and stoping. Metal values are in lead and silver, with some gold. Consideration is being given to plans for mill erection, the plant possibly to have a 500-ton daily capacity.

Also interested in the project are Allen O. Johnson and Harold Elsner of the Magnolia Iron Works of North Hollywood, Calif. H. K. Thomas is in charge of underground work and Charles F. Ward directs purchasing and construction work.

MINE JACKING GOES FASTER and more safely with SIMPLEX Ratchet Lowering JACKS

No. 1017
10 TON CAPACITY

Single Acting Jacks That Lift Full Capacity on Cap or Toe!

Use these single acting jacks for safe, sure operation in mine jacking—for lifting, lowering, pushing or pulling. Double lever sockets speed work in cramped quarters and in angular lifting. All models will lift full capacity on the toe or on the cap—a feature that only Simplex Ratchet Lowering Jacks give you.

Best materials are used throughout for long-life operation under all conditions. When you specify Simplex you get jacks made by the manufacturer awarded the only gold medal for the safety of jacks by the American Museum of Safety.

Ratchet lowering jacks are available in 14 models with capacities ranging from 5 to 35 tons and lifts from 7 to 18 inches. All have two-way standard lever socket except the largest models. Delivered with lever included.

For full information on all types of Simplex mine jacking equipment write for Bulletin Mines 47.

SIMPLEX HYDRAULIC JACKS

For hydraulic ease of operation plus complete safety on heavy duty jacking in mines. Available in eight models to handle from 3 to 100 tons—tested to 50% overload. Send for Bulletin HJ 47.

Simplex
LEVER • SCREW • HYDRAULIC
Jacks
TEMPLETON, KENLY & COMPANY
1042 South Central Avenue, Chicago 44, Illinois

Manufacturers Forum

Push-and-Pull Jacks for Construction Work

A new Simplex Cramer-type push and pull jack recently introduced by Templeton, Kenly & Co., Chicago, combines lighter weight design with greater strength. The unit is designed for safer and faster lining of piles,

general heavy construction work, and all types of push-and-pull jacking jobs in mining, construction, and railroads. The new jack is available in two models one which extends to 17 in. and weighs 34 lb and one which extends to 30 in. and weighs 42 lb. Both have a rated capacity of 12 tons.

Hewitt-Robins Locates New Warehouse in Charleston, W. Va.

Hewitt-Robins, Inc. has established a warehouse and office in Charleston, W. Va., where an inventory of more than $250,000 worth of mine conveyors will be carried at all times to meet the needs of mines and industries in that area. In addition to mine conveyor equipment, the new warehouse will soon have available for "out-of-stock" delivery Robins vibrating screens and Robins Eliptex dewaterizers.

Side-Dump Earth Mover

Most recent addition to the Euclid Machinery Co.'s line of off-the-highway, earth-moving equipment is a side-dump vehicle with a payload capacity of 40,000 lb and a struck measure capacity of 13 cu yd. Down-folding side gates open automatically by mechanical linkage when the body is raised by hydraulic twin hoists. Either right or left side dumping can be selected by the operator according to the job requirements.

A 200 hp Diesel engine provides power at a top speed, when the vehicle is loaded, of 33.4 mph. Ability to dump the load non-stop over the bank or edge of fill makes this unit useful for mine, quarry, and other off-the-road service.

Corrosion Resisting Coating

Carbo-Kote, a new type of corrosion resisting coating produced by the Carboline Co., St. Louis, Mo., is said to be unaffected by boiling water, resistant to most acids, alkalies, and solvents and mixtures of such corrosives. Although developed primarily for coating wood, Carbo-Kote is said to work equally well on rubber, carbon, and

Wagon Drill Features Pneumatic Feed And Lift

Independent Pneumatic Tool Co., Aurora, Ill., has announced a new wagon drill which features a single reversible pneumatic motor that feeds and raises the drill thereby eliminating the need of a hoist. The drill's mast may be swung 360 deg vertically or horizontally to permit drilling of holes at any angle.

The tubular frame of the rig serves as air receiver, maintaining a continuous supply of air pressure that is said to eliminate the usual pulsations of the hose line. The new Thor drill steel centralizer is designed to center the drill steel with the drifter drill chuck to eliminate difficulty in collaring holes. The new model is equipped with a feed which enables a travel of 8 ft. fiber glass, and with the use of a special primer it may be used on steel and other surfaces.

At soft-coal strip mining operations of the Central Ohio Coal Co., East Fultonham, Ohio, this dragline established a peak record of moving nearly 700,000 cu yd using Jones & Laughlin wire rope.

Twin Disc hydraulic drives serve 34 heavy-duty Dart Trucks now in use hauling 20-ton loads of iron ore from open-pit mines on the Mesabi Range. The twin disc hydraulic drive is reported to provide smooth, uniform type of power loading and take sudden high-torque demands with a "cushioned-out" effect due to the use of hydraulic coupling.

Transparent Drafting Tool

Instrumaster Industries, Inc. have available a plastic T-Square which is made with a head and blade integral in a single unit to maintain a fixed position at all times.

Plastic Brattice Cloth

For use in mines as a temporary or permanent barrier to direct ventilation to or away from areas where it is or is not required, The B. F. Goodrich

Co. has recently announced that it is manufacturing Koroseal brattice cloth. The company claims that the new brattice cloth is a more efficient material, more convenient to use, and will outwear the conventional treated jute or burlap cloth used in this service. Other advantages cited are that: Koroseal will not burn except when flame is directly and constantly applied; mildew and mine damp have little or no effect on it; resistant to action of acid mine water and atmospheric gases; does not absorb moisture; excellent tear strength and abrasion resistance; and completely impervious to air.

— *Announcements* —

V. L. Snow, formerly manager of sales development for **The Euclid Road Machinery Co.**, has been promoted to assistant sales manager. **E. F. Armington** is director of sales and **W. W. Paape** is sales manager. **R. M. Brown** has succeeded Mr. Snow as manager of the sales development.

George W. Bergman has recently been appointed district sales manager of the Knoxville area for the **Joy Manufacturing Co.**

The Westvaco Chemical Corp. has been merged into the Food Machinery Corp. and will be known as **Westvaco Chemical Division—Food Machinery and Chemical Corp.**

Harry K. Franklin, formerly service manager of the Chicago office of **Streeter-Amet Co.**, has been appointed branch manager of their Pittsburgh office. He will continue with complete control of service and maintenance from their Pittsburgh office.

Frank B. Powers has been appointed assistant vice-president, production department of the **American Car and Foundry Co.**

C. W. Staacke, a member of the B. F. Goodrich Co.'s engineering staff for 22 years, has joined **Hewitt-Robins Inc.** as a technical consultant.

J. N. Counter was recently appointed manager of sales for the Rocky Mountain division of the **Colorado Fuel and Iron Corp.**

The **Ohio Brass Co.** has moved its Boston office from 49 Federal Street to 620 Boston Chamber of Commerce Building at 80 Federal Street. **Lindsay Ellms** is district manager in charge of the office.

Ralph M. Hoffman, president of Link-Belt Co., Pacific Division, San Francisco, was recently elected a vice-president of the parent **Link-Belt Co.**

Henry V. Bootes, formerly district sales manager of the New York sales district has been appointed assistant vice-president of **American Car and Foundry Co.**

Gilbert B. Richards has been appointed general sales manager of **Firth Sterling Steel & Carbide Corp.**, with headquarters at McKeesport, Pa.

Hobart C. McDaniel has been appointed manager, Technical Press Service in the public relations department of **Westinghouse Electric Corp.**, Pittsburgh, Pa. He succeeds **Carl E. Nagle** who has resigned to join McGraw-Hill Book Co.

George R. Throope, Jr., was recently appointed Chicago district manager of the **American Zinc Sales Co.**

Catalogs and Bulletins

GYRATORY CRUSHER. *Straub Manufacturing Co., Inc., Oakland 7, Calif.* Designed to operate on the principles of "crushing without rubbing," the Straub Manufacturing Co. describes its Kue-Ken Gyracone reduction crusher in booklet No. 604. An extremely low rate of wear is claimed for these crushers, construction is heavy and loss of head is low as the Gyracone is an extremely low machine. The 18-in. crusher is only slightly more than 30 in. high. Copies of a booklet describing this gyratory-type crusher are available from the manufacturer.

MINE CONVEYORS. *Hewitt-Robins Incorporated, Passaic, N. J.* The Robins Conveyors Division of Hewitt-Robins Incorporated has recently published a booklet No. 127-A on mine conveyors describing a complete conveyor for underground operations. The differences between the three types of conveyors made by Hewitt-Robins are defined and the variations possible in takeups, controls, and pulley outfits are discussed. Hewitt-Robins Incorporated assumes unit responsibility for both the machinery and the belting supplied with their mine conveyors. Copies of this booklet are available upon application to the manufacturer.

MODERN FOUNDRY PRACTICE. *McNally-Pittsburg Mfg. Corp., Pittsburg, Kans.* In a 20-page booklet the buyer and user of iron castings is presented with an illustrated explanation of operating control, metal characteristics, and methods and practices in use in modern foundries. Analytical data on processing cast iron and a specification summary on iron castings are also included. Copies are available upon request.

— Index To Advertisers —

	Page
Aluminum Co. of America	16
American Conveyor Co	103
American Cyanamid Co	78–79
American Steel & Wire Co	24–25
Anaconda Wire & Cable Co	55
Bucyrus-Erie Co.	17
Centrifugal & Mechanical Industries, Inc.	105
Clarkson Mfg. Co.	21
Crane Co.	4
Deister Concentrator Co., The	100
Denver Equipment Co	14
Edison, Inc., Thos. A Storage Battery Division	22
Gardner-Denver Co.	10
General Electric Co	18–19
Goodman Mfg. Co	11–23
Hoffman Bros. Drilling Co	112
Independent Pneumatic Tool Co	2
I-T-E Circuit Breaker Co	101
Jeffrey Mfg. Co	8–9
Joy Mfg. Co	56–57
Kennametal Inc.	77
Link-Belt Co.	Second Cover
Little Sister Coal Corp	104
Longyear Co., E. J	15
Mack Mfg. Corp.	7
Mine Safety Appliances Co	Back Cover
Mott Core Drilling Co	112
National Mine Service Co	6
Ohio Brass Co	12–13
Paris Mfg. Co	104
Pennsylvania Drilling Co	112
Sanford-Day Iron Works	1
Sauerman Bros., Inc	105
Sheffield Steel Co	107
Standard Oil Co. of California	20
Templeton, Kenly & Co	109
Timken Roller Bearing Co	26
Union Pacific Co	80
U. S. Rubber Co	Third Cover
Universal Vibrating Screen Co	112
Victaulic Co. of America	102
Worthington Pump & Machinery Co	5
Young, L. E	101

Established 1902

HOFFMAN BROS. DRILLING CO.

CONTRACTORS

DIAMOND CORE DRILLING

PUNXSUTAWNEY, PA.

Our specialty—Testing bituminous coal lands
Satisfactory cores guaranteed.

CORE DRILLING

ANYWHERE

"We look into the earth"

PENNSYLVANIA DRILLING COMPANY

PITTSBURGH 20, PA.

UNIVERSAL SCREENS and UNIVIBE RIDDLES

Vibrating Screens and Vibratory Riddles, in many sizes and types, all priced most reasonably. . . . Tried, Proved and Guaranteed Products. Leaders in Screening Field Since 1919.

Write for Catalog on Screens and Screening

Two Deck Model 42" x 96" Motor & V-rope Dr.

UNIVERSAL VIBRATING SCREEN CO.

RACINE WISCONSIN

DIAMOND CORE DRILLING

CONTRACTORS

TESTING COAL AND ALL MINERAL PROPERTIES - USING OUR LIGHT GASOLINE DRILLS.. THEY SAVE FUEL AND MOVING COSTS..WE GUARANTEE SATISFACTORY AND PROPER CORES..

PRE-PRESSURE GROUTING FOR MINE SHAFTS... GROUND SOLIDIFICATION FOR WET MINE AREAS BY OUR STOP GROUT METHOD. WATER WELLS AND DISCHARGE HOLES DRILLED AND GROUTED... ELECTRIC DRILLS FOR INSIDE MINE DRILLING..

MOTT CORE DRILLING CO.

HUNTINGTON, W. VA.

EASIER TO SEE...SAFER TO USE

U.S. Royal Gold Cables

These mine trailing cables have a golden yellow color, for high visibility. They provide new highs in safety —without loss in efficiency.

The jacket is made of tough *pressure-cured* Neoprene —highly resistant to abrasion, cutting, heat, moisture, and oil. Beneath the jacket, a strong cotton braid covers the insulation.

The insulation itself is the finest rubber compound, with a tensile strength as high as 1400 pounds per sq. in. Conductors are of annealed coated copper, the stranding of which is designed specifically for mine trailing cables.

U.S. Royal Gold Cables are approved as tough enough for your roughest jobs only after they have passed seven gruelling "torture" tests. They are approved as flame-resistant by the Pennsylvania Department of Mines.

ALL U. S. ROYAL MINING MACHINE AND LOCOMOTIVE CABLES ARE AVAILABLE IN BLACK OR NEW GOLDEN YELLOW. Write today for free sample to United States Rubber Company, Wire and Cable Department, 1230 Avenue of the Americas, New York 20, N. Y.

APPROVED AS FLAME-RESISTANT

BY THE PENNSYLVANIA DEPARTMENT OF MINES

unfailing EDISON LIGHT

aids teamwork underground

The smooth operation of each group of workers underground is aided strongly by Edison Electric Cap Lamps. Brilliant, *unfailing* light, powered by the unique Edison nickel-iron-alkaline battery, enables each miner to do his work better—and more safely—at all times. May we arrange a practical demonstration for you?

EDISON ELECTRIC CAP LAMPS

M·S·A

MINE SAFETY APPLIANCES COMPANY

BRADDOCK, THOMAS AND MEADE STREETS . . . . . PITTSBURGH 8, PA.

District Representatives in Principal Cities

In Canada

MINE SAFETY APPLIANCES COMPANY OF CANADA LIMITED

TORONTO . . . MONTREAL . . . CALGARY . . . WINNIPEG . . . VANCOUVER . . . NEW GLASGOW, N. S.

SOUTH AMERICAN HEADQUARTERS — MINE SAFETY APPLIANCES CO. (S.A.) (PTY) LTD.

Johannesburg, South Africa, N'Dola—Northern Rhodesia

er-
ps.
son
his
nge